PRUETT COM

EPA

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OTS DOCUMENT CONTROL OFFICE

PRUETT-SCHAFFER
HEAD OF TABOR ST.
PITTSBURGH, PA 15204

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Comprehensive Assessment Information Rule

REPORTING FORM

When completed, send this form to:

Document Processing Center
Office of Toxic Substances, TS-790
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460
Attention: CAIR Reporting Office

For Agency Use Only:

Date of Receipt: _____

Document Control Number: _____

Docket Number: _____

EPA Form 7710-52

Contains No CBI

SECTION 1 GENERAL MANUFACTURER, IMPORTER, AND PROCESSOR INFORMATION

PART A GENERAL REPORTING INFORMATION

1.01 This Comprehensive Assessment Information Rule (CAIR) Reporting Form has been completed in response to the Federal Register Notice of..... [1][2] (mo.) [2][2] (day) [8][8] (year)

CBI

[ ] a. If a Chemical Abstracts Service Number (CAS No.) is provided in the Federal Register, list the CAS No. ..... [0][2][6][4][7][1]-[6][2]-[5]

b. If a chemical substance CAS No. is not provided in the Federal Register, list either (i) the chemical name, (ii) the mixture name, or (iii) the trade name of the chemical substance as provided in the Federal Register.

(i) Chemical name as listed in the rule ..... _____

(ii) Name of mixture as listed in the rule .... _____

(iii) Trade name as listed in the rule ..... _____

c. If a chemical category is provided in the Federal Register, report the name of the category as listed in the rule, the chemical substance CAS No. you are reporting on which falls under the listed category, and the chemical name of the substance you are reporting on which falls under the listed category.

Name of category as listed in the rule ..... _____

CAS No. of chemical substance ..... [ ][ ][ ][ ][ ][ ]-[ ][ ]-[ ]

Name of chemical substance ..... TOLUENE DIISOCYANATE

1.02 Identify your reporting status under CAIR by circling the appropriate response(s).

CBI

Manufacturer 1

[ ] Importer 2

Processor ..... (3)

X/P manufacturer reporting for customer who is a processor 4

X/P processor reporting for customer who is a processor 5

[ ] Mark (X) this box if you attach a continuation sheet.

1.03 Does the substance you are reporting on have an "x/p" designation associated with it in the above-listed Federal Register Notice?

CBI

[ ]

Yes ..... [X] Go to question 1.04

No ..... [ ] Go to question 1.05

1.04 a. Do you manufacture, import, or process the listed substance and distribute it under a trade name(s) different than that listed in the Federal Register Notice? Circle the appropriate response.

CBI

[ ]

Yes 1

No ..... (2)

b. Check the appropriate box below:

[X] You have chosen to notify your customers of their reporting obligations

Provide the trade name(s) .... MONDUR TD-80

[ ] You have chosen to report for your customers

[ ] You have submitted the trade name(s) to EPA one day after the effective date of the rule in the Federal Register Notice under which you are reporting.

1.05 If you buy a trade name product and are reporting because you were notified of your reporting requirements by your trade name supplier, provide that trade name.

CBI

[ ]

Trade name ..... MONDUR TD-80

Is the trade name product a mixture? Circle the appropriate response.

Yes ..... (1)

No 2

1.06 Certification -- The person who is responsible for the completion of this form must sign the certification statement below:

CBI

[ ] "I hereby certify that, to the best of my knowledge and belief, all information entered on this form is complete and accurate."

ELLIOTT R. COYLE, JR.	Elliott R. Coyle	3-20-89
NAME	SIGNATURE	DATE SIGNED

PRESIDENT	(412) 771 - 2000
TITLE	TELEPHONE NO.

[ ] Mark (X) this box if you attach a continuation sheet.

1.07 Exemptions From Reporting -- If you have provided EPA or another Federal agency with the required information on a CAIR Reporting Form for the listed substance within the past 3 years, and this information is current, accurate, and complete for the time period specified in the rule, then sign the certification below. You are required to complete section 1 of this CAIR form and provide any information now required but not previously submitted. Provide a copy of any previous submissions along with your Section 1 submission.

CBI
[__]

"I hereby certify that, to the best of my knowledge and belief, all required information which I have not included in this CAIR Reporting Form has been submitted to EPA within the past 3 years and is current, accurate, and complete for the time period specified in the rule."

NAME	NA SIGNATURE	DATE SIGNED
TITLE	(_____) _____ - _____ TELEPHONE NO.	DATE OF PREVIOUS SUBMISSION

1.08 CBI Certification -- If you have asserted any CBI claims in this report you must certify that the following statements truthfully and accurately apply to all of those confidentiality claims which you have asserted.

CBI
[__]

"My company has taken measures to protect the confidentiality of the information, and it will continue to take these measures; the information is not, and has not been, reasonably ascertainable by other persons (other than government bodies) by using legitimate means (other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding) without my company's consent; the information is not publicly available elsewhere; and disclosure of the information would cause substantial harm to my company's competitive position."

NAME	NA SIGNATURE	DATE SIGNED
TITLE	(_____) _____ - _____ TELEPHONE NO.	

[__] Mark (X) this box if you attach a continuation sheet.

PART B CORPORATE DATA

1.09 Facility Identification

CBI Name [P][R][U][E][T][T]-[S][H][A][F][F][E][R] [C][H][E][M] [C][O] [I][N][C]

[ ] Address [B][O][X] [4][3][5][O] [T][A][B][O][R] [S][T]
Street

[P][I][T][T][S][B][U][R][G][H]
City

[P][A] [1][5][2][0][4]--[4][3][5][O]
State Zip

Dun & Bradstreet Number .....[O][O]-[4][3][4]-[1][6][3][2]

EPA ID Number .....[ ][ ][ ][ ][ ][ ][ ][ ][ ]

Employer ID Number .....2507410700.....[ ][ ][ ][ ][ ][ ][ ][ ][ ]

Primary Standard Industrial Classification (SIC) Code .....[ ][D][2][8]

Other SIC Code .....[ ][ ][ ][ ]

Other SIC Code .....[ ][ ][ ][ ]

1.10 Company Headquarters Identification

CBI Name [S][A][M][E]

[ ] Address
Street

City

[ ][ ] [ ][ ][ ][ ][ ]--[ ][ ][ ][ ]
State Zip

Dun & Bradstreet Number .....[ ][ ]-[ ][ ][ ]-[ ][ ][ ][ ]

Employer ID Number .....[ ][ ][ ][ ][ ][ ][ ][ ][ ]

[ ] Mark (X) this box if you attach a continuation sheet.

1.11 Parent Company Identification

CBI Name [S][A][M][E]

[ ] Address

Street

City

State Zip

Dun & Bradstreet Number .....[ ][ ]-[ ][ ][ ]-[ ][ ][ ][ ]

1.12 Technical Contact

CBI Name [E][L][L][I][O][T][T] [R] [C][O][Y][L][E] [J][R]

[ ] Title [P][R][E][S][I][D][E][N][T]

Address [P][O] [B][O][X] [4][3][5][0] [T][A][B][O][R] [S][T]

Street

[P][I][T][T][S][B][U][R][G][H]

City

State [P][A] Zip [1][5][2][0][4]--[4][3][5][0]

Telephone Number .....[4][1][2]-[7][7][1]-[2][0][0][0]

1.13 This reporting year is from ..... [0][1] [8][8] to [1][2] [8][8]

Mo. Year Mo. Year

[ ] Mark (X) this box if you attach a continuation sheet.

1.14 Facility Acquired -- If you purchased this facility during the reporting year, provide the following information about the seller:

CBI Name of Seller [__]

[__] Mailing Address [__]
Street

[__]
City

[__][__] [__][__][__][__][__]--[__][__][__][__]
State Zip

Employer ID Number .....[__][__][__][__][__][__][__][__]

Date of Sale .....[__][__] [__][__] [__][__]
Mo. Day Year

Contact Person [__]

Telephone Number .....[__][__][__]-[__][__][__]-[__][__][__][__]

1.15 Facility Sold -- If you sold this facility during the reporting year, provide the following information about the buyer:

CBI Name of Buyer [__]

[__] Mailing Address [__]
Street

[__]
City

[__][__] [__][__][__][__][__]--[__][__][__][__]
State Zip

Employer ID Number .....[__][__][__][__][__][__][__][__]

Date of Purchase .....[__][__] [__][__] [__][__]
Mo. Day Year

Contact Person [__]

Telephone Number .....[__][__][__]-[__][__][__]-[__][__][__][__]

[__] Mark (X) this box if you attach a continuation sheet.

1.16 For each classification listed below, state the quantity of the listed substance tha was manufactured, imported, or processed at your facility during the reporting year.

CBI

[ ]

Classification	Quantity (kg/yr
Manufactured	NONE
Imported	NONE
Processed (include quantity repackaged)	287,854
Of that quantity manufactured or imported, report that quantity:	
In storage at the beginning of the reporting year	NONE
For on-site use or processing	NONE
For direct commercial distribution (including export)	NONE
In storage at the end of the reporting year	NONE
Of that quantity processed, report that quantity:	
In storage at the beginning of the reporting year	7189
Processed as a reactant (chemical producer)	287,106
Processed as a formulation component (mixture producer)	NA
Processed as an article component (article producer)	NA
Repackaged (including export)	748
In storage at the end of the reporting year	4740

[ ] Mark (X) this box if you attach a continuation sheet.

PART C IDENTIFICATION OF MIXTURES

1.17 Mixture -- If the listed substance on which you are required to report is a mixture or a component of a mixture, provide the following information for each component chemical. (If the mixture composition is variable, report an average percentage of each component chemical for all formulations.)

CBI

[ ]

Component Name	Supplier Name	Average % Composition by Weight (specify precision, e.g., 45% ± 0.5%)
2,4-TOLUENE DIISOCYANATE	MOBAY CHEM.	80 % ± ?
2,6-TOLUENE DIISOCYANATE	MOBAY CHEM.	20 % ± ?
	Total	100%

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 2 MANUFACTURER, IMPORTER, AND PROCESSOR VOLUME AND USE

2.01 State the total number of years, including the reporting year, that your facility has manufactured, imported, or processed the listed substance.

CBI

[ ]

Number of years manufactured ..... NONE yrs.

Number of years imported ..... NONE yrs.

Number of years processed ..... 5 yrs.

2.02 State the quantity of the listed substance that your facility manufactured, imported, or processed during the corporate fiscal year preceding the reporting year.

CBI

[ ]

Year ending ..... [1][2] [8][7]
Mo. Year

Quantity manufactured ..... NONE kg

Quantity imported ..... NONE kg

Quantity processed ..... 253,589 kg

2.03 State the quantity of the listed substance that your facility manufactured, imported, or processed during the 2 corporate fiscal years preceding the reporting year in descending order.

CBI

[ ]

Year ending ..... [1][2] [8][7]
Mo. Year

Quantity manufactured ..... NONE kg

Quantity imported ..... NONE kg

Quantity processed ..... 253,589 kg

Year ending ..... [1][2] [8][6]
Mo. Year

Quantity manufactured ..... NONE kg

Quantity imported ..... NONE kg

Quantity processed ..... 195,928 kg

[ ] Mark (X) this box if you attach a continuation sheet.

2.04 State the quantity of the listed substance that your facility manufactured, imported, or processed during the 3 corporate fiscal years preceding the reporting year in descending order.

CBI

[ ] Year ending ..... [1][2] Mo. [8][7] Year

Quantity manufactured ..... NONE kg

Quantity imported ..... NONE kg

Quantity processed ..... 253,589 kg

Year ending ..... [1][2] Mo. [8][6] Year

Quantity manufactured ..... NONE kg

Quantity imported ..... NONE kg

Quantity processed ..... 195,928 kg

Year ending ..... [1][2] Mo. [8][5] Year

Quantity manufactured ..... NONE kg

Quantity imported ..... NONE kg

Quantity processed ..... 228,014 kg

2.05 Specify the manner in which you manufactured the listed substance. Circle all appropriate process types.

NONE

CBI

[ ]

Continuous process 1

Semicontinuous process 2

Batch process 3

[ ] Mark (X) this box if you attach a continuation sheet.

2.06 CBI Specify the manner in which you processed the listed substance. Circle all appropriate process types.

[ ]

Continuous process 1

Semicontinuous process 2

Batch process ..... (3)

2.07 CBI State your facility's name-plate capacity for manufacturing or processing the listed substance. (If you are a batch manufacturer or batch processor, do not answer this question.)

[ ]

Manufacturing capacity ..... BATCH PROCESS _____ kg/yr

Processing capacity ..... _____ kg/yr

2.08 CBI If you intend to increase or decrease the quantity of the listed substance manufactured, imported, or processed at any time after your current corporate fiscal year, estimate the increase or decrease based upon the reporting year's production volume.

[ ]

	Manufacturing Quantity (kg)	Importing Quantity (kg)	Processing Quantity (kg)
Amount of increase	—	—	UKN
Amount of decrease	—	—	UKN

[ ] Mark (X) this box if you attach a continuation sheet.

2.09 For the three largest volume manufacturing or processing process types involving the listed substance, specify the number of days you manufactured or processed the listed substance during the reporting year. Also specify the average number of hours per day each process type was operated. (If only one or two operations are involved, list those.)

CBI

[ ]

	Days/Year	Average Hours/Day
Process Type #1 (The process type involving the largest quantity of the listed substance.)		
Manufactured	NA	
Processed	220	6.5
Process Type #2 (The process type involving the 2nd largest quantity of the listed substance.)		
Manufactured	NA	
Processed		
Process Type #3 (The process type involving the 3rd largest quantity of the listed substance.)		
Manufactured	NA	
Processed		

2.10 State the maximum daily inventory and average monthly inventory of the listed substance that was stored on-site during the reporting year in the form of a bulk chemical.

CBI

[ ]

Maximum daily inventory	36,993	kg
Average monthly inventory (END OF MOS.)	14,340	kg

[ ] Mark (X) this box if you attach a continuation sheet.

2.11 Related Product Types -- List any byproducts, coproducts, or impurities present with the listed substance in concentrations greater than 0.1 percent as it is manufactured, imported, or processed. The source of byproducts, coproducts, or impurities means the source from which the byproducts, coproducts, or impurities are made or introduced into the product (e.g., carryover from raw material, reaction product, etc.).

CBI

[ ]

CAS No.	Chemical Name	Byproduct, Coproduct or Impurity[1]	Concentration (%) (specify ± % precision)	Source of Byproducts, Coproducts, or Impurities
		NA		

[1]Use the following codes to designate byproduct, coproduct, or impurity:

B = Byproduct
C = Coproduct
I = Impurity

[ ] Mark (X) this box if you attach a continuation sheet.

2.12 Existing Product Types -- List all existing product types which you manufactured, imported, or processed using the listed substance during the reporting year. List the quantity of listed substance you use for each product type as a percentage of the total volume of listed substance used during the reporting year. Also list the quantity of listed substance used captively on-site as a percentage of the value listed under column b., and the types of end-users for each product type. (Refer to the instructions for further explanation and an example.)

CBI
[ ]

a. Product Types[1]	b. % of Quantity Manufactured, Imported, or Processed	c. % of Quantity Used Captively On-Site	d. Type of End-Users[2]
B	99.74 %	100	I
B	0.26 %	0	I

[1]Use the following codes to designate product types:

A = Solvent
B = Synthetic reactant
C = Catalyst/Initiator/Accelerator/Sensitizer
D = Inhibitor/Stabilizer/Scavenger/Antioxidant
E = Analytical reagent
F = Chelator/Coagulant/Sequestrant
G = Cleanser/Detergent/Degreaser
H = Lubricant/Friction modifier/Antiwear agent
I = Surfactant/Emulsifier
J = Flame retardant
K = Coating/Binder/Adhesive and additives
L = Moldable/Castable/Rubber and additives
M = Plasticizer
N = Dye/Pigment/Colorant/Ink and additives
O = Photographic/Reprographic chemical and additives
P = Electrodeposition/Plating chemicals
Q = Fuel and fuel additives
R = Explosive chemicals and additives
S = Fragrance/Flavor chemicals
T = Pollution control chemicals
U = Functional fluids and additives
V = Metal alloy and additives
W = Rheological modifier
X = Other (specify) _____

[2]Use the following codes to designate the type of end-users:

I = Industrial
CM = Commercial
CS = Consumer
H = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

2.13 Expected Product Types -- Identify all product types which you expect to manufacture, import, or process using the listed substance at any time after your current corporate fiscal year. For each use, specify the quantity you expect to manufacture, import, or process for each use as a percentage of the total volume of listed substance used during the reporting year. Also list the quantity of listed substance used captively on-site as a percentage of the value listed under column b., and the types of end-users for each product type. (Refer to the instructions for further explanation and an example.)

CBI

[ ]

a. Product Types[1]	b. % of Quantity Manufactured, Imported, or Processed	c. % of Quantity Used Captively On-Site	d. Type of End-Users[2]
B	APPROX 99.75	100	I
B	APPROX 0.25	0	I

[1]Use the following codes to designate product types:

A = Solvent
B = Synthetic reactant
C = Catalyst/Initiator/Accelerator/Sensitizer
D = Inhibitor/Stabilizer/Scavenger/Antioxidant
E = Analytical reagent
F = Chelator/Coagulant/Sequestrant
G = Cleanser/Detergent/Degreaser
H = Lubricant/Friction modifier/Antiwear agent
I = Surfactant/Emulsifier
J = Flame retardant
K = Coating/Binder/Adhesive and additives
L = Moldable/Castable/Rubber and additives
M = Plasticizer
N = Dye/Pigment/Colorant/Ink and additives
O = Photographic/Reprographic chemical and additives
P = Electrodeposition/Plating chemicals
Q = Fuel and fuel additives
R = Explosive chemicals and additives
S = Fragrance/Flavor chemicals
T = Pollution control chemicals
U = Functional fluids and additives
V = Metal alloy and additives
W = Rheological modifier
X = Other (specify) _____

[2]Use the following codes to designate the type of end-users:

I = Industrial
CM = Commercial
CS = Consumer
H = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

2.14 Final Product -- Complete the following table for each type of final product manufactured, imported, or processed at your facility that contains the listed substance other than as an impurity.

CBI

[ ]

a. Product Type[1]	b. Final Product's Physical Form[2]	c. Average % Composition of Listed Substance in Final Product	d. Type of End-Users[3]
B	B	77%	I
B	B	100%	I

[1]Use the following codes to designate product types:

A = Solvent
B = Synthetic reactant
C = Catalyst/Initiator/Accelerator/Sensitizer
D = Inhibitor/Stabilizer/Scavenger/Antioxidant
E = Analytical reagent
F = Chelator/Coagulant/Sequestrant
G = Cleanser/Detergent/Degreaser
H = Lubricant/Friction modifier/Antiwear agent
I = Surfactant/Emulsifier
J = Flame retardant
K = Coating/Binder/Adhesive and additives
L = Moldable/Castable/Rubber and additives
M = Plasticizer
N = Dye/Pigment/Colorant/Ink and additives
O = Photographic/Reprographic chemical and additives
P = Electrodeposition/Plating chemicals
Q = Fuel and fuel additives
R = Explosive chemicals and additives
S = Fragrance/Flavor chemicals
T = Pollution control chemicals
U = Functional fluids and additives
V = Metal alloy and additives
W = Rheological modifier
X = Other (specify) _____

[2]Use the following codes to designate the final product's physical form:

A = Gas
B = Liquid
C = Aqueous solution
D = Paste
E = Slurry
F1 = Powder
F2 = Crystalline solid
F3 = Granules
F4 = Other solid
G = Gel
H = Other (specify) _____

[3]Use the following codes to designate the type of end-users:

I = Industrial
CM = Commercial
CS = Consumer
H = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

2.15 Circle all applicable modes of transportation used to deliver bulk shipments of the CBI listed substance to off-site customers.

[ ] Truck ..... (1)

Railcar 2

Barge, Vessel 3

Pipeline 4

Plane 5

Other (specify) _____ 6

2.16 Customer Use -- Estimate the quantity of the listed substance used by your customers or prepared by your customers during the reporting year for use under each category CBI of end use listed (i-iv).

[ ]

Category of End Use

i. Industrial Products

Chemical or mixture ..... NA kg/yr

Article ..... NA kg/yr

ii. Commercial Products

Chemical or mixture ..... NA kg/yr

Article ..... NA kg/yr

iii. Consumer Products

Chemical or mixture ..... NA kg/yr

Article ..... NA kg/yr

iv. Other

Distribution (excluding export) ..... NA kg/yr

Export ..... NA kg/yr

Quantity of substance consumed as reactant ..... 287,106 kg/yr

Unknown customer uses ..... 748 kg/yr

[ ] Mark (X) this box if you attach a continuation sheet.

2.17 State the quantity of the listed substance that you exported during the reporting year.

CBI

[ ]

In bulk ..... NONE kg/y

As a mixture ..... NONE kg/y

In articles ..... NONE kg/y

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 3 PROCESSOR RAW MATERIAL IDENTIFICATION

PART A GENERAL DATA

3.01 Specify the quantity purchased and the average price paid for the listed substance for each major source of supply listed. Product trades are treated as purchases.
CBI The average price is the market value of the product that was traded for the listed substance.
[ ]

Source of Supply	Quantity (kg)	Average Price ($/kg)
The listed substance was manufactured on-site.	NA	
The listed substance was transferred from a different company site.	NA	
The listed substance was purchased directly from a manufacturer or importer.	285,405	$2.40
The listed substance was purchased from a distributor or repackager.	NA	
The listed substance was purchased from a mixture producer.	NA	

3.02 Circle all applicable modes of transportation used to deliver the listed substance to
CBI your facility.
[ ]

Truck ..... (1)
Railcar 2
Barge, Vessel 3
Pipeline 4
Plane 5
Other (specify) _____ 6

[ ] Mark (X) this box if you attach a continuation sheet.

3.03 CBI

a. Circle all applicable containers used to transport the listed substance to your facility.

[ ]

Bags 1

Boxes 2

Free standing tank cylinders 3

Tank rail cars 4

Hopper cars 5

Tank trucks 6

Hopper trucks 7

Drums 8

Pipeline 9

Other (specify) _____ 10

b. If the listed substance is transported in pressurized tank cylinders, tank rail cars, or tank trucks, state the pressure of the tanks.

Tank cylinders ..... NA mmHg

Tank rail cars ..... _____ mmHg

Tank trucks ..... _____ mmHg

[ ] Mark (X) this box if you attach a continuation sheet.

PART B RAW MATERIAL IN THE FORM OF A MIXTURE

3.04 If you obtain the listed substance in the form of a mixture, list the trade name(s) of the mixture, the name of its supplier(s) or manufacturer(s), an estimate of the CBI average percent composition by weight of the listed substance in the mixture, and the amount of mixture processed during the reporting year.

[ ]

Trade Name	Supplier or Manufacturer	Average % Composition by Weight (specify ± % precision)	Amount Processed (kg/yr)
MONDUR TD-80	MOBAY CHEM.	100	287,854

[ ] Mark (X) this box if you attach a continuation sheet.

PART C RAW MATERIAL VOLUME

3.05 CBI [ ] State the quantity of the listed substance used as a raw material during the reporting year in the form of a class I chemical, class II chemical, or polymer, and the percent composition, by weight, of the listed substance.

	Quantity Used (kg/yr)	% Composition by Weight of Listed Substance in Raw Material (specify ± % precision)
Class I chemical	287,106	100 %
Class II chemical	NA	
Polymer	NA	

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 4 PHYSICAL/CHEMICAL PROPERTIES

General Instructions:

If you are reporting on a mixture as defined in the glossary, reply to questions in Section 4 that are inappropriate to mixtures by stating "NA -- mixture."

For questions 4.06-4.15, if you possess any hazard warning statement, label, MSDS, or other notice that addresses the information requested, you may submit a copy or reasonable facsimile in lieu of answering those questions which it addresses.

PART A PHYSICAL/CHEMICAL DATA SUMMARY

4.01 Specify the percent purity for the three major[1] technical grade(s) of the listed substance as it is manufactured, imported, or processed. Measure the purity of the substance in the final product form for manufacturing activities, at the time you import the substance, or at the point you begin to process the substance.

CBI

[ ]

	Manufacture	Import	Process
Technical grade #1	— % purity	— % purity	100 % purity
Technical grade #2	_____ % purity	_____ % purity	_____ % purity
Technical grade #3	_____ % purity	_____ % purity	_____ % purity

[1]Major = Greatest quantity of listed substance manufactured, imported or processed.

4.02 Submit your most recently updated Material Safety Data Sheet (MSDS) for the listed substance, and for every formulation containing the listed substance. If you possess an MSDS that you developed and an MSDS developed by a different source, submit your version. Indicate whether at least one MSDS has been submitted by circling the appropriate response.

Yes ..... (1)

No 2

Indicate whether the MSDS was developed by your company or by a different source.

Your company 6403 (1)

Another source ..... TDI (2)

[ ] Mark (X) this box if you attach a continuation sheet.

MSDS here

MATERIAL SAFETY DATA SHEET

Mobay Corporation
A Bayer USA INC. COMPANY

Bayer

DIVISION ADDRESS

MOBAY CORPORATION
Polyurethane Division
Mobay Road
Pittsburgh, PA 15205-9741

ISSUE DATE 3/21/88
SUPERSEDES 9/14/87

TRANSPORTATION EMERGENCY: CALL CHEMTREC
TELEPHONE NO: 800-424-9300; DISTRICT OF COLUMBIA: 202-483-7616

MOBAY NON-TRANSPORTATION EMERGENCY NO.:
(412) 923-1800

I. PRODUCT IDENTIFICATION

PRODUCT NAME.....: Mondur TD-80 (All Grades)
PRODUCT CODE NUMBER.....: E-002
CHEMICAL FAMILY.....: Aromatic Isocyanate
CHEMICAL NAME.....: Toluene Diisocyanate (TDI)
SYNONYMS.....: Benzene, 1,3-diisocyanato methyl-
CAS NUMBER.....: 26471-62-5
T.S.C.A. STATUS.....: On Inventory
OSHA HAZARD COMMUNICATION STATUS.....: This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
CHEMICAL FORMULA.....: $C_9H_6N_2O_2$

II. HAZARDOUS INGREDIENTS

COMPONENTS:	%:	OSHA-PEL	ACGIH-TLV
2,4-Toluene Diisocyanate (TDI) CAS# 584-84-9	80%	0.02 ppm Ceiling	0.005 ppm TWA 0.02 ppm STEL
2,6-Toluene Diisocyanate (TDI) CAS# 91-08-7	20%	Not Established	Not Established

III. PHYSICAL DATA

APPEARANCE.....: Liquid
COLOR.....: Water white to pale yellow
ODOR.....: Sharp, pungent
ODOR THRESHOLD.....: Greater than TLV of 0.005 ppm
MOLECULAR WEIGHT.....: 174
MELT POINT/FREEZE POINT..: Approx. 55°F (13°C)
BOILING POINT.....: Approx. 484°F (251°C)
VAPOR PRESSURE.....: Approx. 0.025 mmHg @ 77°F (25°C)
VAPOR DENSITY (AIR=1)....: 6.0
pH.....: Not Applicable
SPECIFIC GRAVITY.....: 1.22 @ 77°F (25°C)
BULK DENSITY.....: 10.18 lbs/gal
SOLUBILITY IN WATER.....: Reacts slowly with water at normal room temperature to liberate CO_2 gas.
% VOLATILE BY VOLUME.....: Negligible

IV. FIRE & EXPLOSION DATA

FLASH POINT $^{o}F(^{o}C)$.....: $260^{o}F$ ($127^{o}C$) Pensky-Martens Closed Cup
FLAMMABLE LIMITS -
Lel.....: 0.9%
Uel.....: 9.5%
EXTINGUISHING MEDIA.....: Dry chemical (e.g. monaammonium phosphate, potassium sulfate, and potassium chloride), carbon dioxide, high expansion (proteinic) chemical foam, water spray for large fires. Caution: Reaction between water or foam and hot TDI can be vigorous.
SPECIAL FIRE FIGHTING PROCEDURES/UNUSUAL FIRE OR EXPLOSION HAZARDS:
Full emergency equipment with self-contained breathing apparatus and full protective clothing (such as rubber gloves, boots, bands around legs, arms and waist) should be worn by fire fighters. No skin surface should be exposed. During a fire, TDI vapors and other irritating, highly toxic gases may generated by thermal decomposition or combustion. (See Section VIII). At temperatures greater than $350^{o}F$ ($177^{o}C$) TDI forms carbodiimides with the release of CO_2 which can cause pressure build-up in closed containers. Explosive rupture is possible. Therefore, use cold water to cool fire-exposed containers.

V. HUMAN HEALTH DATA

PRIMARY ROUTE(S) OF ENTRY.....: Inhalation. Skin contact from liquid, vapors or aerosols.

EFFECTS AND SYMPTOMS OF OVEREXPOSURE

INHALATION

Acute Exposure. TDI vapors or mist at concentrations above the TLV can irritate (burning sensation) the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function (breathing obstruction). Persons with a preexisting, nonspecific bronchial hyperractivity can respond to concentrations below the TLV with similar symptoms as well as asthma attack. Exposure well above the TLV may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). These effects are usually reversible. Chemical or hypersensitive pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure.

Chronic Exposure. As a result of previous repeated overexposures or a single large dose, certain individuals may develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the TLV. These symptoms, which can include chest tightness, wheezing, cough, shortness of breath or asthmatic attack, could be immediate or delayed up to several hours after exposure. Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air or other irritants. This increased lung sensitivity can persist for weeks and in severe cases for several years. Chronic overexposure to isocyanate has also been reported to cause lung damage (including decrease in lung function) which may be permanent. Sensitization can either be temporary or permanent.

V. HUMAN HEALTH DATA (Continued)

SKIN CONTACT

Acute Exposure. Isocyanates react with skin protein and moisture and can cause irritation which may include the following symptoms: reddening, swelling, rash, scaling or blistering. Cured material is difficult to remove.

Chronic Exposure. Prolonged contact can cause reddening, swelling, rash, scaling, blistering, and, in some cases, skin sensitization. Individuals who have developed a skin sensitization can develop these symptoms as a result of contact with very small amounts of liquid material or as a result of exposure to vapor.

EYE CONTACT

Acute Exposure. Liquid, aerosols or vapors are severely irritating and can cause pain, tearing, reddening and swelling. If left untreated, corneal damage can occur and injury is slow to heal. However, damage is usually reversible. See Section VI for treatment.

Chronic Exposure. Prolonged vapor contact may cause conjunctivitis.

INGESTION

Acute Exposure. Can result in irritation and corrosive action in the mouth, stomach tissue and digestive tract. Symptoms can include sore throat, abdominal pain, nausea, vomiting and diarrhea.

Chronic Exposure. None found.

MEDICAL CONDITIONS

AGGRAVATED BY EXPOSURE..: Asthma, other respiratory disorders (bronchitis, emphysema, bronchial hyperractivity), skin allergies, eczema.

CARCINOGENICITY.....: No carcinogenic activity was observed in lifetime inhalation studies in rats and mice (International Isocyanate Institute).

NTP.....: The National Toxicology Program reported that TDI caused an increase in the number of tumors in exposed rats over those counted in non-exposed rats. The TDI was administered in corn-oil and introduced into the stomach through a tube. Based on this study, the NTP has listed TDI as a substance that may reasonably be anticipated to be a carcinogen in its Fourth Annual Report on Carcinogens.

IARC.....: IARC has announced that it will list TDI as a substance for which there is sufficient evidence for its carcinogenicity in experimental animals but inadequate evidence for the carcinogencity of TDI to humans (IARC Monograph 39).

OSHA.....: Not listed.

EXPOSURE LIMITS

OSHA PEL.....: 0.02 ppm Ceiling

ACGIH TLV.....: 0.005 ppm TWA/0.02 ppm STEL

VI. EMERGENCY & FIRST AID PROCEDURES

EYE CONTACT.....: Flush with copious amounts of water, preferably lukewarm for at least 15 minutes holding eyelids open all the time. Refer individual to physician or an ophthalmologist for immediate follow-up.

VI. EMERGENCY & FIRST AID PROCEDURE (Continued)

SKIN CONTACT.....: Remove contaminated clothing immediately. Wash affected areas thoroughly with soap and water for at least 15 minutes. Tincture of green soap and water is also effective in removing isocyanates. Wash contaminated clothing thoroughly before reuse. For severe exposures, get under safety shower after removing clothing, then get medical attention. For lesser exposures, seek medical attention if irritation develops or persists after the area is washed.
INHALATION.....: Move to an area free from risk of further exposure. Administer oxygen or artificial respiration as needed. Obtain medical attention. Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Consult physician.
INGESTION.....: Do not induce vomiting. Give 1 to 2 cups of milk or water to drink. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Consult physician.
NOTE TO PHYSICIAN.....: Eyes. Stain for evidence of corneal injury. If cornea is burned, instill antibiotic steroid preparation frequently. Workplace vapors have produced reversible corneal epithelial edema impairing vision. Skin. This compound is a known skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burns. Ingestion. Treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of this compound. Respiratory. This compound is a known pulmonary sensitizer. Treatment is essentially symptomatic. An individual having a skin or pulmonary sensitization reaction to this material should be removed from exposure to any isocyanate.

VII. EMPLOYEE PROTECTION RECOMMENDATIONS

EYE PROTECTION.....: Liquid chemical goggles or full-face shield. Contact lenses should not be worn. If vapor exposure is causing irritation, use a full-face, air-supplied respirator.
SKIN PROTECTION.....: Chemical resistant gloves (butyl rubber, nitrile rubber, polyvinyl alcohol). However, please note that PVA degrades in water. Cover as much of the exposed skin area as possible with appropriate clothing. If skin creams are used, keep the area covered only by the cream to a minimum.
RESPIRATORY PROTECTION....: An approved positive pressure air-supplied respirator is required whenever TDI concentrations are not known or exceed the Short-Term Exposure or Ceiling Limit of 0.02 ppm or exceed the 8-hour Time Weighted Average TLV of 0.005 ppm. An approved air-supplied respirator with full facepiece must also be worn during spray application, even if exhaust ventilation is used. For emergency and other conditions where the exposure limits may be greatly exceeded, use an approved, positive pressure self-contained breathing apparatus. TDI has poor warning properties since the odor at which TDI can be smelled is substantially higher than 0.02 ppm. Observe OSHA regulations for respirator use (29 CFR 1910.134).

VII. EMPLOYEE PROTECTION RECOMMENDATIONS (Continued)

VENTILATION.....: Local exhaust should be used to maintain levels below the TLV whenever TDI is handled, processed, or spray-applied. At normal room temperatures (70°F) TDI levels quickly exceed the TLV unless properly ventilated. Standard reference sources regarding industrial ventilation (e.g., ACGIH Industrial Ventilation) should be consulted for guidance about adequate ventilation.

MONITORING.....: TDI exposure levels must be monitored by accepted monitoring techniques to ensure that the TLV is not exceeded. (Contact Mobay for guidance). See Volume 1 (Chapter 17) and Volume 3 (Chapter 3) in Patty's Industrial Hygiene and Toxicology for sampling strategy.

MEDICAL SURVEILLANCE.....: Medical supervision of all employees who handle or come in contact with TDI is recommended. These should include preemployment and periodic medical examinations with respiratory function tests (FEV, FVC as a minimum). Persons with asthmatic-type conditions, chronic bronchitis, other chronic respiratory diseases or recurrent skin eczema or sensitization should be excluded from working with TDI. Once a person is diagnosed as sensitized to TDI, no further exposure can be permitted.

OTHER.....: Safety showers and eyewash stations should be available. Educate and train employees in safe use of product. Follow all label instructions.

VIII. REACTIVITY DATA

STABILITY.....: Stable under normal conditions.

POLYMERIZATION.....: May occur if in contact with moisture or other materials which react with isocyanates. Self-reaction may occur at temperatures over 350°F (177°C) or at lower temperatures if sufficient time is involved. See Section IV.

INCOMPATIBILITY (MATERIALS TO AVOID)....: Water, amines, strong bases, alcohols. Will cause some corrosion to copper alloys and aluminum. Reacts with water to form heat, CO_2, and insoluble ureas.

HAZARDOUS DECOMPOSITION PRODUCTS.....: By high heat and fire: carbon monoxide, oxides of nitrogen, traces of HCN, TDI vapors and mist.

IX. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Evacuate and ventilate spill area; dike spill to prevent entry into water system; wear full protective equipment, including respiratory equipment during clean-up. (See Section VII).

Major Spill: Call Mobay at 412/923-1800. If transportation spill, call CHEMTREC 800/424-9300. If temporary control of isocyanate vapor is required, a blanket of protein foam (available at most fire departments) may be placed over the spill. Large quantities may be pumped into closed, but not sealed, container for disposal.

IX. SPILL OR LEAK PROCEDURES (Continued)

Minor Spill: Absorb isocyanate with sawdust or other absorbent, shovel into suitable unsealed containers, transport to well-ventilated area (outside) and treat with neutralizing solution: mixture of water (80%) with non-ionic surfactant Tergitol TMN-10 (20%), or; water (90%), concentrated ammonia (3-8%) and detergent (2%). Add about 10 parts or neutralizer per part of isocyanate, with mixing. Allow to stand uncovered for 48 hours to let CO_2 escape.
Clean-up: Decontaminate floor with decontamination solution letting stand for at least 15 minutes.

CERCLA (SUPERFUND) REPORTABLE QUANTITY: 100 pounds for TDI

WASTE DISPOSAL METHOD.....: Follow all federal, state or local regulations. TDI must be disposed of in a permitted incinerator or landfill. Incineration is the preferred method for liquids. Solids are usually incinerated or landfilled. Empty containers must be handled with care due to product residue. Decontaminate containers prior to disposal. Empty decontaminated containers should be crushed to prevent reuse. DO NOT HEAT OR CUT EMPTY CONTAINER WITH ELECTRIC OR GAS TORCH. (See Sections IV and VIII). Vapors and gases may be highly toxic.

RCRA STATUS.....: TDI is listed as a hazardous waste (No. U-223) under Title 40 Code of Federal Regulations, Section 261.33 (f). The residue from decontaminating a TDI spill is also classified as a hazardous waste under Section 261.3 (c)(2) or RCRA.

X. SPECIAL PRECAUTIONS & STORAGE DATA

STORAGE TEMPERATURE
(MIN./MAX.).....: $70^{o}F$ ($21^{o}C$)/$90^{o}F$ ($32^{o}C$)
AVERAGE SHELF LIFE.....: 12 months
SPECIAL SENSITIVITY
(HEAT, LIGHT, MOISTURE).: If container is exposed to high heat, $375^{o}F$ ($177^{o}C$) it can be pressurized and possibly rupture. TDI reacts slowly with water to form polyureas and liberates CO_2 gas. This gas can cause sealed containers to expand and possibly rupture.
PRECAUTIONS TO BE TAKEN
IN HANDLING AND STORING.: Store in tightly closed containers to prevent moisture contamination. Do not reseal if contamination is suspected. Prevent all contact. Do not breathe the vapors. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent chronic overexposure from inhalation. This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposures to lower concentrations. Exposure to vapors of heated TDI can be extremely dangerous. Employee education and training in safe handling of this product are required under the OSHA Hazard Communication Standard.

XI. SHIPPING DATA

D.O.T. SHIPPING NAME.....:	Toluene Diisocyanate
TECHNICAL SHIPPING NAME...:	Toluene Diisocyanate
D.O.T. HAZARD CLASS.....:	Poison B
UN/NA NO.....:	UN 2078
PRODUCT RQ.....:	100 pounds
D.O.T. LABELS.....:	Poison
D.O.T. PLACARDS.....:	Poison
FRT. CLASS BULK.....:	Toluene Diisocyanate
FRT. CLASS PKG.....:	Chemicals, NOI (Toluene Diisocyante) NMFC 60000
PRODUCT LABEL.....:	Mondur TD-80 Product Label

XII. ANIMAL TOXICITY DATA

ACUTE TOXICITY

ORAL, LD50.....: Range of 4130-6170 mg/kg (Rats and Mice)

DERMAL, LD50.....: Greater than 10,000 mg/kg (Rabbits)

INHALATION, LC50.(4 hr).: Range of 16-50 ppm (Rat), 10 ppm (Mouse), 11 ppm (Rabbit), 13 ppm (Guinea Pig).

EYE EFFECTS.....: Severe eye irritant capable of inducing corneal opacity.

SKIN EFFECTS.....: Moderate skin irritant. Primary dermal irritation score: 4.12/8.0 (Draize). However, repeated or prolonged contact may culminate in severe skin irritation and/or corrosion.

SENSITIZATION.....: Skin sensitizer in guinea pigs. One study using guinea pigs reported that repeated skin contact with TDI caused respiratory sensitization. Although poorly defined in experimental animal models, TDI is known to be a pulmonary sensitizer in humans. In addition, there is some evidence that cross-sensitization between different types of diisocyanates may occur.

SUB-CHRONIC/CHRONIC TOXICITY: Sub-chronic and chronic animal studies show that the primary effects of inhaling vapors and/or aerosols of TDI are restricted to the pulmonary systems. Emphysema, pulmonary edema, pneumonitis and rhinitis are common pathologic effects. Extended exposures to as low as 0.1 ppm TDI have induces pulmonary inflammation.

OTHER

CARCINOGENICITY.....: The NTP conducted carcinogenesis studies of a commercial grade TDI using rats and mice in which the test material was diluted in corn oil and administered by gavage. The investigators concluded that TDI was carcinogenic in male and female rats (fibrosarcomas, pancreatic adenomas, neoplastic liver nodules and mammary gland fibrosarcomas) and female mice (hemangiosarcomas and hepatocellular adenomas). However, chronic inhalation studies in which rats and mice were exposed to 0.05 and 0.15 ppm TDI (10-30 times recommended TLV, 8-hr level) induced no treatment-related tumorigenic effects. In these studies, both exposure levels produced extensive irritation to the nasal passages and upper respiratory system of the test animals indicating that suitable effective exposures were administered.

XII. ANIMAL TOXICITY DATA (Continued)

MUTAGENICITY.....: TDI is positive in the Ames assay with activation. However, mammalian cell transformation assays using human lung cells and Syrian hamster kidney cells were negative, as were micronucleus tests using rats and mice.

AQUATIC TOXICITY.....: LC_{50} - 96 hr (static): 165 mg/liter (Fathead minnow)
LC_{50} - 96 hr (static): Greater than 508 mg/liter (Grass shrimp)
LC_{50} - 24 hr (static): Greater than 500 mg/liter (Daphnia magna)

XIII. APPROVALS

REASON FOR ISSUE.....: Correcting Section II, Hazardous Ingredients
PREPARED BY.....: G. L. Copeland
APPROVED BY.....: J. H. Chapman
TITLE.....: Manager, Product Safety - Polyurethane

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of Mobay Corporation. The data on this sheet relates only to the specific material designated herein. Mobay Corporation assumes no legal responsibility for use or reliance upon these data.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: 6403 NAFIL Resin
PRODUCT CODE: 6403

HMIS CODES:

H	F	R	P
3*	1	2	X

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: PRUETT SCHAFFER CHEMICAL
ADDRESS: PRUETT SCHAFFER CHEMICAL Corp., P.O. Box 4350 Pgh. PA 15204
EMERGENCY PHONE: 412-771-2000 **INFORMATION PHONE:** 412-771-2000
DATE REVISED : 01-31-89 **NAME OF PREPARER :** Robert P. Barry
REASON REVISED : New health hazard data, see SECTION VI.

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

HAZARDOUS COMPONENTS	CAS NUMBER	OCCUPATIONAL EXPOSURE LIMITS ACGIH TLV	OCCUPATIONAL EXPOSURE LIMITS SECTION 313 REPORT	VAPOR PRESSURE mm Hg @ TEMP		WEIGHT PERCENT
Toluene Diisocyanate (TDI), 2,4- and 2,6- isomers	1321-38-6	0.005 ppm	Report Required	0.0	77F	79.69
Sucrose Polyether Polyol	9049-71-2	None known		N/A		20

This product may contain toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40 CFR 372. See "Hazardous Components" above for their identification.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT: 484 degrees F.
SPECIFIC GRAVITY (H2O=1): 1.2
VAPOR DENSITY: HEAVIER THAN AIR
EVAPORATION RATE: SLOWER THAN ETHER
COATING V.O.C. : N/A
SOLUBILITY IN WATER: Reacts slowly with water to liberate CO2 gas.
APPEARANCE AND ODOR: Viscous, pale-yellow liquid with a pungent odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 260 F.
METHOD USED: PMMC
FLAMMABLE LIMITS IN AIR BY VOLUME- LOWER: N/A **UPPER:** N/A

EXTINGUISHING MEDIA: FOAM, ALCOHOL FOAM, CO2, DRY CHEMICAL, WATER FOG, OTHER

SPECIAL FIREFIGHTING PROCEDURES
Wear self-contained breathing apparatus and full protective clothing. Highly toxic gases and vapors may be generated by decomposition or combustion. Restrict area to all but essential personnel. Control runoff if possible by diking.

UNUSUAL FIRE AND EXPLOSION HAZARDS
DO NOT RESEAL CONTAINERS THAT HAVE BEEN CONTAMINATED WITH WATER; CO2 may be generated in closed container causing it to burst. Cool containers exposed to fire with water spray; material may self-polymerize at temperatures higher than 350 F. Wear SCBA after fire is extinguished, dangerous vapors may persist. Turnout gear may need decontamination before reuse.

SECTION V - REACTIVITY DATA

STABILITY: STABLE

CONDITIONS TO AVOID

At temperatures above 350 deg F, material may self-polymerize. Keep containers tightly closed and away from moisture.

INCOMPATIBILITY (MATERIALS TO AVOID)

Contact with water, alcohols, amines, strong bases, metal compounds, surface active agents, and phosphorus compounds.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS

Thermal decomposition may yield CO2, carbon monoxide, oxides of nitrogen, hydrogen cyanide, and toluene diisocyanate.

HAZARDOUS POLYMERIZATION: MAY OCCUR

CO2 gas produced by self-polymerization at temperatures above 350 deg F may pressurize container resulting in rupture.

SECTION VI - HEALTH HAZARD DATA

INHALATION HEALTH RISKS AND SYMPTOMS OF EXPOSURE

Inhalation of toluene diisocyanate vapor above the Threshold Limit Value of .005 ppm may cause irritation of the respiratory tract, dryness of the throat, tightness in chest, or coughing. Symptoms may be immediate or delayed.

SKIN AND EYE CONTACT HEALTH RISKS AND SYMPTOMS OF EXPOSURE

SKIN CONTACT: irritation, reddening, swelling, rash, scaling, or blistering; in severe cases dermatitis is possible. EYE CONTACT: tearing, reddening, swelling, stinging sensation. If left untreated,corneal damage or conjunctivitis may occur.

SKIN ABSORPTION HEALTH RISKS AND SYMPTOMS OF EXPOSURE

Skin absorbtion may cause skin sensitization. Skin absorbtion of very small amounts of liquid or exposure to vapor of sensitized individuals may cause effects similiar to those identified under skin contact signs and symptoms.

INGESTION HEALTH RISKS AND SYMPTOMS OF EXPOSURE

Can result in irritation and possible corrosive action in the mouth, stomach tissues, and digestive tract. Vomiting and diarrhea may result. No chronic health hazards are known resulting from ingestion.

HEALTH HAZARDS (ACUTE AND CHRONIC)

ACUTE: chest discomfort, coughing, shortness of breath, reduced lung function, asthma-like symptoms. Exposures well above the TLV may cause bronchitis, bronchial spasm, and pulmonary edema (fluid in lungs). These effects are reversible. CHRONIC: Repeated overexposure or a single large overexposure may produce sensitization (chemical asthma) to isocyanates or to other irritants. Decrease in lung function may be temporary or permanent. Flu-like symptoms have been reported.

CARCINOGENICITY: NTP? YES **IARC MONOGRAPHS?** YES **OSHA REGULATED?** NO

The National Toxicology Program (NTP) lists TDI as a substance that may reasonably be anticipated to be carcinogenic. The IARC reports inadequate evidence for carcinogenicity in humans (IARC monograph 39). OSHA does not list TDI.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

Asthma, bronchitis, chronic respiratory disease, pre-existing specific isocyanate hypersensitivity, skin allergies.

EMERGENCY AND FIRST AID PROCEDURES

EYES: flush with tepid water for 15 minutes. Obtain medical attention at once. SKIN: wash affected area with soap and water. Remove and wash contaminated clothing. INGESTION: DO NOT INDUCE VOMITING. Consult physician. INHALATION: move to area free from risk of further exposure. Administer oxygen or artificial respiration as needed. Obtain medical attention Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Treatment is essentially symptomatic. Once a person is diagnosed as sensitized to isocyanate, no further exposure can be permitted.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Evacuate nonessential personnel. Dike material, prevent entry into sewers or waterways. Provide ventillation, wear respiratory protection. MAJOR SPILL: call Mobay Corp. at 412-923-1800. TRANSPORTATION SPILL: call CHEMTREC at 88-424-9300.

WASTE DISPOSAL METHOD

Cover spill with absorbant material, pour dilute solution of ammonia/water over spill and let react for 10 minutes. Shovel material into open top containers and add more decontamination solution. Remove containers to a safe place, cover loosely, let stand for 48 hours. Wash down spill area. Dispose of waste in accordance with all governing regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Store between 70-90 deg F. Keep containers tightly closed. Do not reseal a moisture-contaminated container. Material reacts slowly with water to generate CO2 gas, contaminated closed container may rupture. Average shelf life of this material is 6 months. TRAIN AND EDUCATE EMPLOYEES in the safe handling and use of this product, it is required by law.

OTHER PRECAUTIONS

DO NOT CUT, WELD, GRIND, SOLDER, OR BRAZE ON OR NEAR CONTAINER WHETHER FULL OR EMPTY. Do not reuse empty containers. Do not eat or smoke while using. Medical supervision of employees who handle isocyanates is recommended. This should include pre-employment and periodic respiratory function tests (FEV,FVC minimum). Once a person has been diagnosed as sensitized to TDI, permit no further exposure. Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination. TDI exposure levels should be monitored by accepted techniques to ensure personnel safety.

SECTION VIII - CONTROL MEASURES

RESPIRATORY PROTECTION

If airborne concentrations exceed the TLV or are not known, use a positive pressure air-supplied respirator, such as a Mine Safety Appliance #475217. TDI has poor warning properties since the odor at which it can be smelled is substantially higher than the TLV. At normal room temperatures, TDI levels quickly exceed the TLV when exposed to air.

VENTILATION

Ventilation sufficient to keep airborne concentrations of vapor and mist below the TLV's must be used. Refer to "Industrial Ventilation" published by the American Conference of Governmental Industrial Hygiensts for guidance.

PROTECTIVE GLOVES

Chemical resistant gloves(butyl rubber, nitrile rubber, polyvinyl alcohol)should be used. Do not rely on leather gloves.

EYE PROTECTION

Safety glasses, splash goggles, or full face shield should be used. Contact lenses should not be worn while handling.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT

Wear as much protective clothing as possible to minimize skin contact. At minimum use a full apron or coveralls if applying spray or foam. Wash contaminated clothing before reuse.

WORK/HYGIENIC PRACTICES

Emergency safety shower and eyebath should be available. Keep work area free of contaminated rags or empty containers.

SECTION IX - DISCLAIMER

DISCLAIMER

The information and recommendations contained herein were believed to be accurate at the time of preparation or obtained from sources believed to be generally reliable. Pruett Schaffer Chemical Corporation makes no warranty concerning their accuracy and will not be held liable for claims relating to any party's use of or reliance on this information.

4.03 Submit a copy or reasonable facsimile of any hazard information (other than an MSDS) that is provided to your customers/users regarding the listed substance or any formulation containing the listed substance. Indicate whether this information has been submitted by circling the appropriate response.

Yes ..... (1)

No 2

4.04 For each activity that uses the listed substance, circle all the applicable number(s) corresponding to each physical state of the listed substance during the activity listed. Physical states for importing and processing activities are determined at the time you import or begin to process the listed substance. Physical states for manufacturing, storage, disposal and transport activities are determined using the final state of the product.

CBI

[ ]

	Physical State				
Activity	Solid	Slurry	Liquid	Liquified Gas	Gas
Manufacture	1	2	3	4	5
Import	1	2	3	4	5
Process	1	2	(3)	4	(5)
Store	1	2	(3)	4	5
Dispose	1	2	3	4	5
Transport	1	2	(3)	4	5

[ ] Mark (X) this box if you attach a continuation sheet.

1

Compiled by the
International Isocyanate Institute, Inc.

Recommendations for the Handling of Toluene Diisocyanate (TDI)

November 1980
*Revised

Organic isocyanates are chemicals characterized by the general chemical formula R $(NCO)_x$. The commercially most important of these are toluene diisocyanate (TDI) and 4,4' diisocyanatodiphenylmethane (MDI, pure or polymeric). The alternative names for toluene diisocyanate are tolylene diisocyanate or toluylene diisocyanate but the abbreviation TDI is now universally used and understood in the industry. The recommended procedures outlined in this document refer particularly to TDI but may also apply as guidelines to isocyanates having a vapour pressure higher than 10^{-3} mbar at 25° C. Since mono and diisocyanates of similar vapour pressure are used in industry as intermediates and are not covered by this brochure, the handling recommendations for these products should be obtained from the supplier.

TDI is of great importance in a wide variety of industry applications but its most important use is in the production of flexible polyurethane foam the majority of which is used in the furniture industry as cushioning, mattresses, etc., and for seating in the automotive industry.

Like many reactive chemicals TDI products can create hazards if handled carelessly and the purpose of this publication is to outline certain precautions, the observance of which will materially reduce these hazards in handling isocyanates under normal and emergency conditions.

All persons concerned with TDI or products containing TDI must be fully conversant with their hazards and trained in the recommended normal and emergency handling procedures.

This publication is intended to provide general guidance only. In some countries specific regulations supplement or modify the guidance given. All intending users of TDI are strongly urged to consult with the appropriate regulatory authorities before finalizing specifications for operating premises, processing equipment, storage requirements, etc. Similar consultation is appropriate for existing users of TDI when planning substantial changes in their processes.

Information on local regulatory requirements should be sought from TDI suppliers.

3.0 TECHNICAL INFORMATION

3.1 Understanding the Material, its Properties and Hazards

3.1.1 Physical Properties

TDI is a colourless to pale yellow liquid of characteristic pungent odour. The physical properties of this product are detailed in Appendix 1.

3.1.2 Chemical Reactivity

TDI is heavier than water and will sink to the bottom of water-filled containers. Although it reacts with water, the rate of reaction is slow at temperatures below 50°C because the reaction produces insoluble urea at the interface which limits mass transfer. At higher temperatures, or in well dispersed systems the reaction becomes progressively more vigorous. This reaction of TDI with water liberates carbon dioxide gas and a solid, insoluble mass of polyureas is formed. Pressure can build up in closed containers.

TDI will also react with basic chemicals such as sodium hydroxide (caustic soda), ammonia, primary and secondary amines and with acids and alcohols. The reaction may be violent, generating heat which can result in an increased evolution of isocyanate vapour and in the presence of water the formation of carbon dioxide, leading to a build up of pressure within closed containers.

The high reactivity of isocyanates is the basis for the poly-addition process for preparation of polyurethane plastics and foams.

TDI is not generally corrosive towards metals or other materials at normal temperatures. Isocyanates may attack and embrittle many plastic and rubber materials in a short time. Although this is not dangerous in itself, it may lead to cracking, for example, of hoses full of product if the incorrect material is used. Recommendations for suitable components are available on request from raw material suppliers or equipment manufacturers.

3.1.3 Occupational Health Hazards

The proteins of the human organism are also reactive and will be affected when exposed to isocyanates, in a similar manner to basic materials, as noted above.

This may create a health hazard under certain circumstances. The effect depends mainly on time, nature and extent of the exposure.

Experience and occupational health observation in the isocyanate industry over the past 25 years has shown that handling of TDI can be safe but always requires care to avoid over exposure and resulting health hazards.

The three routes of contacting isocyanates are ingestion, direct contact to the skin or eyes and inhalation of vapours or mists. From the practical point of view, the principal risk arises from vapours because they are liberated to the atmosphere in all aspects of handling. The concentration of vapours is mainly dependant on the vapour pressure of the individual isocyanates and the handling conditions.

Overexposure to vapours or mists irritates the membranes of the nose, throat, lungs and eyes. Overexposure to vapour will produce a variety of symptoms, which may include watering of the eyes, irritation of the throat, tightness of the chest (sometimes with difficulty in breathing) and headaches. Full development of symptoms may be delayed for several hours after overexposure has taken place. Allergy like asthmatic symptoms may occur in susceptible subjects.

Prolonged or repeated overexposure may lead to sensitization by inhalation.

Since isocyanates present a real toxicity hazard by inhalation, repeated short term or prolonged inhalation of mists or vapours in high concentrations (see 3.1.3.2) should be avoided.

3.1.3.2 Control of Overexposure to Vapours or Mists

The chemical industry and legislative bodies co-operate to define the limit of exposure to commonly used chemicals. Generally, these limits are based on doses over a time period which is a so-called Time Weighted Average (TWA). Further, in the case of chemicals, the term TLV is commonly used. This Threshold Limit Value-Time Weighted Average (TLV-TWA) is the time-weighted average concentration for a normal 8 hour workday or 40 hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

For short term exposures other limits may exist for some chemicals but in the case of TDI it was found in a very early stage (1961) that this value should be set to 0,02 ppm which currently is valid in most countries (the reader is advised to check the current value in his area). This limit is known as the Threshold Limit Value-Ceiling (TLV-C), the concentration that should not be exceeded even instantaneously.

The vapour pressure of TDI is such that at normal temperature, the concentration of vapour in the air will exceed the TLV-C. Therefore, full precautions are necessary whenever TDI or products with a certain amount of free TDI monomer are handled outside controlled conditions. It should be noted that the odour threshold of TDI is about the TLV, although the actual odour threshold will vary from individual to individual.

3.1.3.3 Effects on eyes

Isocyanates in the form of liquid irritates the eyes severely, causing watering, discomfort, transitory corneal damage has been reported. Vapour causes irritation in concentrations significantly higher than the TLV-C.

3.1.3.4 Effects on Skin

Isocyanates have a tanning action on the skin. Occasionally, contact dermatitis may be produced as a manifestation of a specific skin reaction.

First aid procedures are included as Appendix 3. (see page 33).

3.2.6.3 Special Protective Equipment

Special protective equipment is to be used with TDI and isocyanate-containing products wherever there is risk of exposure to concentrations of vapour in excess of the TLV-C. Such conditions can occur when TDI is handled at ambient temperature outside a properly ventilated area, during installation and testing of engineering controls, during performance of non-routine maintenance or repair when working in confined spaces.

Suggested special protective equiment is:

- Goggles or face shield
- Rubber or PVC gloves
- Canister respirator
- or fresh air fed breathing hoods
- or portable breathing apparatus
- Boiler suit/overall (heavy cotton types preferred).

Canister masks contain active carbon which absorbs TDI. It must be noted that canister respirators suffer from two disadvantages. Firstly, the action of breathing reduces the mask pressure below that of the atmosphere, thus allowing the potential for air ingress around the mask sides if the mask is incorrectly fitted. A low pressure test should always be made before use, by checking that if the cartridge entrance is covered, the mask pulls into the face. Secondly, the active carbon absorbs atmospheric moisture and can cause dry throats if worn for more than a few minutes. Nonetheless, if used properly, these masks are useful for short periods in atmospheres with TDI content close to TLV-C.

3.2.6.4 Emergency Protective Equipment

Emergency protective equipment is to be used with TDI whenever a significant level of TDI vapour greatly exceeding the TLV exists, or there is any doubt as to the level due to the non routine nature of the task.

Required emergency protective equipment is:

- Positive pressure mask breathing apparatus with full face visor
- Fitted long sleeve rubber or PVC gloves
- Full water-proof good quality suit (such as sold for acid handling)
- Fitted rubber boots
- Head protection

A sufficient number of sets of emergency protection equipment should be ready for use at appropriate places.

3.3 Receipt of Isocyanate Packages

3.3.1 General

TDI is generally delivered in one of four packages: a 250 kg drum, a demountable tank or road tanker containing up to approximately 20 tonnes or a rail tanker containing up to 50-100 tonnes. Handling procedures for the three last types of package are similar.

3.3.2 Equipment at the Consumer

3.3.2.1 General

Suppliers will generally provide information packages outlining typical storage installations. TDI is generally inert to metals, but does show a tendency to discolour at temperature in excess of approximately 40°C in the presence of iron.

Tanks and pipes can be satisfactorily made out of good quality carbon steels.[1] Pressure rating is a consumer decision as it relates directly to cost. However, economies on pressure rating lower the integrity of the tank during unusual situations, such as pressure build up, and cause relief devices to be bigger for given duties. The scale of the tank(s) at the consumer is a function of expected throughput and the vulnerability of the supply.

Drum storage areas should ideally be covered to protect from rain and sun. If this is not possible and solar heating is severe then some form of shading should be arranged.

[1] ASME code VIII or BS 1515 category 2 would be suitable.

3.3.2.3 Bunding (Diking)

Tanks and drum storages should be bunded to minimize the consequences of failure. Positioning of pumps inside bunds is also good practice. The bund should have no drain or if necessary a locked valve should be used.

3.3.2.4 Separation

Although TDI is relatively non-flammable, it should not be stored adjacent to highly flammable materials. Separation with fire walls would be suitable. Furthermore, it is good practice to separate TDI storage from the workplace. Bunding as appropriate should be used to prevent solvents running beneath TDI tanks if these tanks were to fail.

3.3.2.5 Tank Atmosphere Control

Tanks should be blanketed with dry inert gas to prevent contamination. Air or nitrogen with less than 100 ppm water, dew point approximately -40° C, would be suitable. Use of carbon dioxide as a blanketing gas is not recommended because of high solubility of CO_2 in TDI.

Breather vents from the tanks should discharge to the main factory vent. Conservation vents should be used or balanced pneumatic or electric input/output valves used. Tank pressure should be low, less than 1 psig or 14 Pa to avoid excessive venting, although the gas charging system must be able to provide sufficient gas to maintain this pressure at maximum instantaneous liquid discharge rates.

3.3.2.6 Tank Pressure Relief

Relief of TDI tanks should be carefully considered, bearing in mind that the primary function is for these to work in arduous and unusual circumstances. Obstruction of the discharge should be avoided at all cost. Clearly, therefore, direct atmospheric discharge should be considered. Use of high design pressure for the tank is therefore an influential factor, as discharges can be restricted to extreme conditions only. If location forces the discharge of reliefs to a duct, the back pressure at the relief device must be accounted, both at point of discharge and full discharge rate. Worst possibilities should be designed for. Relief valves are most appropriate as the TDI will be contained as soon as the set pressure is re-established. However, because of the effect of atmospheric moisture on TDI which produces hard ureas that can jam the spring arrangement, rupture discs should be fitted at both inlet and outlet of the valve. At the inlet, the disc should be compatible with TDI and the setting close to that of the relief valve itself. At the discharge, the disc should be set at a very low pressure.

A regular inspection schedule should be set for the tank and relief valve/rupture disc combination. A tell-tale pressure sensor should be located between the upstream disc and the relief valve, any sign of pressure here must be taken to indicate a disc failure and result in an overhaul of the whole relief assembly.

Other easy working tank pressure relief systems, e.g. liquid sealing, are available.

3.3.2.7 Tank Temperature Control

Temperature control of storage tanks is clearly necessary. Electric immersion of skin heating is preferred, steam or hot water heating can be used, indoor storage should be considered. Controls must ensure adequate (20-25° C) temperature range. Mixing may be necessary if large variations in material temperatures or isomer separation has occurred. Heater controls must fail safe and alarm at 40° C. The tank and all pipework should be lagged and steam or electrically traced as appropriate. In certain circumstances cooling equipment may have to be used.

3.3.2.8 Tanker Unloading Facilities

If the consumer will be unloading road or rail tankers or demountable tanks, a safe unloading bay is required. Preferably the points of connections, usually on the tanker top, should be protected from rain and adequate barriers provided to prevent falling accidents. Usually, two connections are required, one for liquid discharge, often 50 mm (2 inches) and a vent connection usually 25 mm (1 inch). These sizes are different to prevent cross connection.

Flexible pipes are clearly necessary and can be made of synthetic materials, braided and corrugated metal, or jointed pipe sections, counter-balancing may be required.

Hoses made from fluoroelastomers are suitable for low or medium pressure duty. Flexible pipes of PTFE suitably metal braided on the outside must be used on high pressure machines. Gaskets of compressed asbestos fibre are suitable for high temperature use. At lower temperatures, PTFE/rubber envelope gaskets or fluoroelastomer 'O' rings are useful.

Pipelines to allow discharge of liquid should be provided. When material is not being discharged these pipes should be free of TDI and closed to prevent moisture entering. All hoses used for TDI and particularly those used for unloading should be subject to regular checks. In some countries it may be obligatory to pressure test at fixed intervals. Currently both pressure and pump discharge are practiced. For pump discharge an additional pipeline to return this placed vapour from the customer storage tank and a suitable pump must be provided. Pumps for discharge should preferably be self-priming or designed to be so. Canned pumps cause no atmospheric TDI leaks in comparison with packed or mechanical seal pumps, although self-priming is probably the primary design criteria.

During pressure discharge it is impossible to return displaced vapour from customer storage tank to the tanker. The vapour should either be discharged to the main factory vent or adsorbed, e.g. by an activated carbon filter. Pumps discharge is the preferred method because in pressure discharge there is the need to handle displaced vapour as mentioned above, and additionally a hose rupture during pressure unloading can have more serious consequences than with pump unloading.

3.3.2.9 Drum Unloading Facilities

Drums usually arrive either on pallets containing four drums or singly. They may be stuffed inside a container. Fork trucks should be used for unloading, rather than slings. The fork truck should be equipped with appropriate drum grabs if drums are to be handled singly. Care should be taken to ensure that drums are not damaged in this operation.

Less sophisticated equipment is necessary for drum unloading which may be done by gravity unloading or pump.

Melting of frozen TDI is currently accomplished by several methods. Manufacturer's recommendations are to be followed. In general, by one method, TDI can be melted by the use of hot air in a heated room where drum rollers may be employed. Care should be taken to ensure that the drum is not damaged and can endure the time of heating exposure specified for melting. Another method is to apply ambient steam to the drum. In this instance exposure to heat is much shorter; however, great care must be utilized to prevent water and/or water vapour to enter the drum through the bung or any part of the damaged drum. Only full unopened containers should be treated with ambient steam after precaution has been taken to tighten the bung and apply dust caps. Failure to observe these precautions may result in pressure build up within the drum.

Warmed drums should then be fitted with appropriate fittings by an operator either wearing full breathing apparatus or in a properly ventilated booth designed for the purpose.

For discharge to a small tank, an immersion pump inserted through the large bung will be suitable. Alternatively, the drum can be gravity discharged if location makes this convenient. Note, if the drum itself is to be used for storage of part lots, the air entering the drum should be dried by passing it through a silica gel filter screwed into the small bung.

Air displaced from the receiving tank should be returned to the drum or discharged to the fume extraction system.

Handling of drums is a potentially hazardous operation and adequate equipment should be used. Never discharge drums by pressurizing them and always make sure air can displace the liquid removed without reducing drum pressure. Adequate ventilation should be provided, (see Section 3.2.3.). Drums should be reclosed if not to be immediately decontaminated.

3.4 Disposal of Waste

3.4.1 General

TDI contamination of waste water streams, the atmosphere and ground dumps must be avoided. To achieve this, all isocyanate must be reacted away to stable urea compounds.

Research commissioned by the I.I.I. indicates that TDI which has been reacted to urea is stable to the effects of water. Experiments on both laboratory and full scale show negligible degradation of the urea when immersed in water or dispersed in various types of soils.

Water, in itself, takes some time to react to completion because of the stabilization of the mass transfer process by the formation of insoluble urea at the interface. It is *not* therefore permissible to dump material on the expectation that reaction will be completed in drains, for example.

3.4.2 Decontamination Procedures

In order to put any procedure into effect, a satisfactory chemical decontaminant for the spilled TDI is necessary. Emergency procedures for spillages are discussed in Section 3.5. (see page 15)

In the case of liquid disposal, it should be adsorbed onto a solid carrier preloaded with active chemicals. In the simplest form, this would be wet sand. The I.I.I. has evidence that the use of wet sand is effective in removing TDI by formation of stable ureas. This information is available from member companies. A more complex decontaminant which is highly efective is

30 parts by wt. "Oil-dri"+
30 parts by wt. "Fullers Earth"
25 parts by wt. 30% ammonia
15 parts by wt. isopropanol

+ Oil-Dri is the trademark of Oil-Dri Ltd.

In certain circumstances, the spilled TDI may be in solid or frozen form. The bulk of such spillages may be removed mechanically and a solvent decontaminant used to clean up the residue.

50% isopropanol
50% 1-1-1 trichloroethane

Both the above decontaminant formulations emit vapours of isopropanol which are flammable. Pure isopropanol has a flash point, closed cup, of 15° C and flammability limits between 2.5 and 5%. Where a fire hazard exists, the following decontaminant may be used:

90-95	parts by wt. water
3-8	parts by wt. conc. ammonia solution
0.2-0.5	parts by wt. detergent

This should be used in place of the 40 parts of isopropyl alcohol and ammonia noted above.

The total weight of decontaminant should be equal to or greater than the weight of TDI spilled.

Small machine parts, piping etc. may also be decontaminated and cleaned with 2-ethoxyethanol*. This also is flammable but has the advantage that reaction products are soluble. Great care must be taken to check that these decontamination methods are completely effective, because small quantities of isocyanate are easily retained by some surfaces. Advice on cleaning complicated equipment should be sought from the equipment supplier.

Care should be exercised when using these decontaminants to ensure that the TLV's for these materials are not exceeded.

Residues and disposal wastes after decontamination should be disposed of as noted in Section 3.4.3.2.

3.4.3 Disposal of Isocyanate Wastes

The following methods of disposal are considered to be technically safe and effective. However, they must be interpreted in the light of existing regulations in force at the time. There are three basic methods; choice will depend in part on the scale of operation, i.e. amount of waste to be treated and in part on the availability of the 'neutralizing' agent.

* Alternative chemical name - Ethylene glycol monoethyl ether

* Alternative chemical name - Ethylene glycol monoethyl ether. Careless handling of 2-ethoxyethanol may cause a health problem. Manufacturers' recommendations are to be consulted and followed. Also note

3.4.3.1 Reaction with Waste Polyol

React with excess waste polyol to make a low quality foam which may be incinerated, tipped (dumped) or otherwise disposed of in an authorised waste disposal area.

3.4.3.2 Reaction with Liquid Decontaminant

React with excess liquid decontaminant by adding the isocyanate slowly and with stirring to liquid decontaminant in a fully opening drum. Leave for 24 hours, decant the excess decontaminant for reuse, close the drum and dispose of by authorized tipping or otherwise in accordance with local legislation.

3.4.3.3 Incineration

Incineration should only be done in properly supervised equipment specially designed for the disposal of noxious chemical wastes.

3.4.3.4 Disposal of Containers

The reuse and the disposal of contaminated empty drums and containers is not permissible except by incineration because of the hazards associated with isocyanate remaining on the walls of the drums. As a matter of principle all residues of isocyanates in containers must be decontaminated in an appropriate way. In no case must decontamined drums be used for food stuffs or food additives.

Decontamination of drums, buckets or other small equipment can be achieved using dilute solutions, e.g. 5-10% sodium carbonate in water, with a small quantity of detergent. Similiarly, 2 to 5% ammonia solutions with detergent are equally effective. Appendix 5 (see page 43) describes a suitable operation in detail. Empty decontaminated drums can then be tipped or scrapped as appropriate. If there is any doubt as to future use, the drums should be holed to prevent unauthorized use to store water, for example.

Further information is presented in the I.I.I. Technical Information No. 3: "Recommendations for the Waste Disposal from Polyurethane Foam Manufacture."

3.5 Emergency Procedures

3.5.1 General

Each works should have a system for dealing with emergencies within the works. Such systems are only effective if regularly practiced. It may be appropriate to go to the extent of forming a works fire crew and emergency team, although everyone should be aware of the hazards involved and the limitations of self help. The first priority should always be to save life rather than limit physical damage.

In considering the various aspects of spillages, it is necessary to distinguish between minor incidents such as may occur in a laboratory or workshop handling isocyanates regularly, and major spillages involving, for example, a bulk road tanker. The most important criterion for distinguishing between the two is the ability of the personnel on the spot to deal with the occurrence rather than the actual scale of the incident.

3.5.2 Major Emergency

The emergency procedure should arrange to evacuate staff to a safe location and there, they should be accounted for. An appointed person should decide whether to summon help from Police and Fire services and the supplier. At this point, the emergency crew should be dispatched, if feasible, to locate missing persons. They should wear appropriate safety equipment.

In the case of a substantial TDI spill, this should be a full protective suit and a positive pressure self contained breathing set, *not* a plant air mask.

After rescuing all persons, attention should change to:

3.5.2.1 Providing assistance to injured or contaminated persons

First aid measures should be applied and *all* contaminated clothing should be stripped off for later disposal. If possible, the persons doing this and the injured/contamined person should wear respiratory protection. The contaminated skin should be washed thoroughly with warm soapy water until all traces of TDI are removed. Respiratory protection should be worn to this point in time. Medical assistance must be obtained.

3.5.2.2 Limiting the extent of the damage depending on the emergency

The first actions should be to contain the problem so that spreading does not cause further problems.

1. All supply valves should be closed or temporary patches placed on holed lines.
2. If possible, remove containers to a safe area away from general access.
3. The spill should be retained with walls made by shoveling solid decontaminant around the pool.
4. If the spill cannot be decontaminated immediately, then the use of fire foam sprayed onto the pool surface will reduce vapour emission, (see ref. 5).
5. In the case of fire, the primary concern should be to establish a fuel free zone.

3.5.2.3 Cleaning Up

In the case of a TDI spill, it will be necessary to absorb all the material onto decontaminant and then, if practicable, remove it physically to a suitable location for further decontamination and disposal. Checks should be made to ascertain that no residual active isocyanate adheres to the ground surface; this should be checked particularly with bituminous product finishes. If it does, then it will be necessary to re-decontaminate or in extreme cases, remove the surface physically by sand blasting for example. After this is complete, the area can be declared safe and re-occupied after satisfactory air samples have been taken.

3.5.3 Minor Emergencies

In the event of a minor spill of TDI being discovered, each individual should know how to evacuate the immediate area. The person should then don full Emergency Protective clothing and decontaminate the spill as appropriate after isolating the spill source. Usually, the use of solid decontaminant will be most effective.

3.5.4 Fire

Most isocyanates have a high flash point and are not normally considered as flammable. However, they may burn if heated sufficiently strongly.

Any isocyanate involved in a fire will evolve toxic fumes in high concentrations. Full emergency equipment (Section 3.2.6.4) should be worn by all personnel dealing with such incidents; the use of self-contained positive pressure breathing apparatus is essential. Drums and tanks of isocyanate involved in a fire but not themselves on fire, should be sprayed with water to minimize risk of rupture. The incidence should be treated as a major emergency - (sec. 3.5.2.).

Suitable extinguishing agents include:

Dry chemical powder*
Carbon dioxide
Water **
Foam **

After the fire has been extinguished, the area should not be considered safe until a thorough inspection for residual isocyanate has been carried out by properly protected personnel. Any suspect residues should be rendered harmless with liquid decontaminant according to the procedures detailed in Sections 3.4.2 and 3.5.2

3.5.5 Leaking Containers

Leaking containers should be turned where possible so that the damaged part is uppermost and covered to prevent entry of rain, dirt, etc. Any spillage should be dealt with according to the instructions given in Section 3.4.2. Damaged containers may be repaired temporarily with the proprietary resin-based metal repair kit, wooden plugs, etc. until the contents can be transferred into a clean, dry container. The damaged container should be decontaminated (Section 3.4.3) before disposal. Recovery drums are available for safe transportation of leaking drums.

3.5.6 Pressurised Containers

A container of isocyanate may have become pressurised due to entry of water (moisture) with subsequent formation of carbon dioxide. Such a container may be recognized easily as it will have become considerably mis-shapen. Any container seen to be in a pressurised state should be isolated immediately and covered, e.g. with tarpaulins. A competent person must then assess the likelihood that the drum may be in such a dangerous state that further action is unwise. If this is the case the covering should be improved and steps taken to contain any spill. The area should be barricaded and the drum inspected after 48 hours have elapsed. If the drum remains intact or is judged not to be in an immediately dangerous state then proceed as follows. The pressure should be relieved either by careful loosening of the bung or, in severe cases, by drilling a small (3 mm) hole through the uppermost part of the drum. Whenever possible, the hole should be drilled or punctured, with a long handled device, through the bung which is the strongest part of the drum. To avoid further ingress of moisture a self-tapping screw may be inserted into the hole. This screw may be released at regular intervals to relieve further build-up of pressure. These operations should be carried out by a competent person wearing full 'emergency' protective equipment. In case of doubt, the supplier should be contacted for advice through the nearest sales office.

* Some dry chemical powders may produce foam when used.

** If water or foam are used, it should be in a very large quantity. Care must be taken as the reaction between water or the water based foam and hot isocyanate can be vigorous.

4.0 HEALTH AND SAFETY CONSIDERATIONS

4.1 Protection of The Work Force and General Public

4.1.1 General

It is the object of the previous sections to outline suitable precautions that should be taken when handling TDI to prevent exposure to hazardous concentrations however, to be certain that these measures are effective, it is necessary to monitor both employees and the environment.

Further, on recruiting new employees and, at a suitable frequency, with existing employees, training should be given on the hazards associated with isocyanate operations and outlining the correct method of completing work tasks to avoid unnecessary exposure.

4.1.2 Monitoring

There are three aspects of work monitoring:

4.1.2.1 Employees

People with a history of asthma or allergies are more likely to become sensitive to TDI than the average population. Therefore a preemployment medical asssessment should be carried out by the company doctor. For further details see Appendix 3 (see page 33).

4.1.2.2 Workplace

Each workplace should be assessed to determine the most likely places for TDI to be discharged to the working atmosphere.

The basic principle for this determination is to consider every location where TDI either pure or as a mixture with other polyurethane components, can leave the closed system of pipes, containers, pumps, machines and mixing heads as a potential emission source.

In so far as such locations are an unavoidable part of the production process, it goes without question that an effective air exhaust must be installed. A periodic check at these points will assure the efficiency of these necessary protective measures.

Examples of such locations are foaming stations, mixing heads, the gate opening point in closed molds, the immediate surroundings during pouring into open molds, the storage point for pouring heads, containers for trial shots and calibration of the pumps, receivers for flushing liquids in low pressure machines, laboratory hoods and spray cabinets.

Further potential sources of TDI vapours are: mold venting, removal of paper or film from slab stock foams as well as flexible foam crushers and foam cutters when fresh foam slabs are being processed.

When personnel at such working locations complain about irritation, the cause usually is TDI vapours. The problem may be compounded by the presence of other foam formulation components such as amines. An improvement of the ventilation, generally solves the problem.

Such complaints must always be quickly and critically examined.

The third group of potential TDI emission sources is leaks. Such leaks are in practice the most common cause for an increase in the TDI concentration. Therefore, it is particularly important that key points be regularly checked. Special attention should be given to all type of seals including pumps, flanges, valves and connections. Any escaping fluids must be tested for TDI. It is not sufficient, as is unfortunately often observed, to collect small amounts of emerging fluids in a container. Where TDI has been recognized as a constituent of a leak effective counter measures must be taken without

A sampling and testing procedure for all three groups of potential emission sources should be stipulated.

Analytical chemical methods are discussed in Appendix 4 (see page 37). These include simple tests which can be done by relatively unskilled operators, for example, pump and sensitive filter disc devices, and continuous reading sensitive tape monitors. Before adopting any analytical procedure, it is wise to check that the authorities accept the validity of the method.

Based on the results of these analyses, corrective action should be taken to ensure compliance with current minimum statutory requirement.

For long term monitoring, the routine analysis of potential discharge points should be continued and recorded. An investigation should be made of each failure to meet the required standard. Further, a scheme of assessment should be devised, capable of identifying the deterioration of a previously satisfactory workplace.

This scheme should take particular note of process changes likely to cause a different workplace environment.

It is good practice for each factory to determine a description for each operation involving TDI handling such that it may be described by a title which is representative of an ongoing function.

Monitoring using a portable paper tape monitor carried by personnel, mobile monitoring, can then be carried out to determine actual exposure levels related to work functions. In cases where problems are identified, corrective modifications should be planned, and short term protective controls, e.g. improved local ventilation or the use of respiratory protection instituted.

In unusual situations, the use of respiratory protection should be mandatory as exposure levels may be unavoidably high and corrective actions impossible or inappropriate. Mobile monitoring is particularly useful during the training period of new employees.

4.1.2.3 Plant Environment and General Public

It is necessary to establish that members of the general public are not exposed to TDI at levels in excess of the statutory requirement. In the planning stage of a new plant, it will be necessary to satisfy the authorities that discharges will be within established criteria. Fixed location monitoring at ground level at the fence line (property line) may be necessary to ensure compliance with statutory requirements, (see Section 3.2.3.), both after start up and at a mutually agreed frequency thereafter.

In the long term, this can be established by monitoring factory vents, (see Section 4.1.2.2.).

4.2 Works Policy

There should be an ongoing evaluation of the situation regarding adherence to existing regulations and changing external circumstances.

Written safety instructions document the correct way of performing task and tend to limit the degradation of job methods caused by verbal training.

Each employee should be trained to handle isocyanates and conform to accepted work methods designed to reduce exposure to TDI.

Each operation should have a specified level of protective equipment. This level should be decided based on environmental conditions.

There should be a "no smoking or eating" policy in all operational areas.

All employees should be encouraged to pursue a personal hygiene policy, including regular washing of personal and working clothing.

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APPENDIX 1 : PHYSICAL DATA OF TDI

I. ITEM	TDI ISOMER RATIO 2,4- to 2,6-			METHOD/SOURCE
	100	**80:20**	**65:35**	
Physical state at normal temps.		Liquid		
Viscosity (mPas at 25° C)	(3-6)	3-6	(3-6)	Brookfield Visc. (ASTM 1638)
purity		>99,5%		
Colour		Colourless to pale yellow		
Odour		Characteristic pungent		
Solubility in water		none, reacts		
Specific Gravity (g/ml) (at 25° C)	1.21	1.21	1.21	I.P. 260
Boiling temp. (°C)	251	251	251	
Flash temp. (°C)	(135) (127)	135 127	(135) (127)	Cleveland O.C. Pensky-Martin O.C.
Fire temp. (°C)	(142)	142	(142)	Cleveland O.C.
Autoignition temp. (°C)	(277)	277 >620	(277)	ASTM-D 2156 DIN 51794
Freezing temp. (°C)	22	<15	<8	
Vapour density (air = 1)	6.0	6.0	6.0	
Vapour pressure (mbar at 25° C)	.03	.03	.03	
Explosion Limits		Lower	Upper	
concentr. % v/v		0.9	9.5	(ref. NFPA sheet H5)
temp. °C		118	150	
Molecular Weight	174,2	174,2	174,2	

( ) expected value from result on 80:20 material

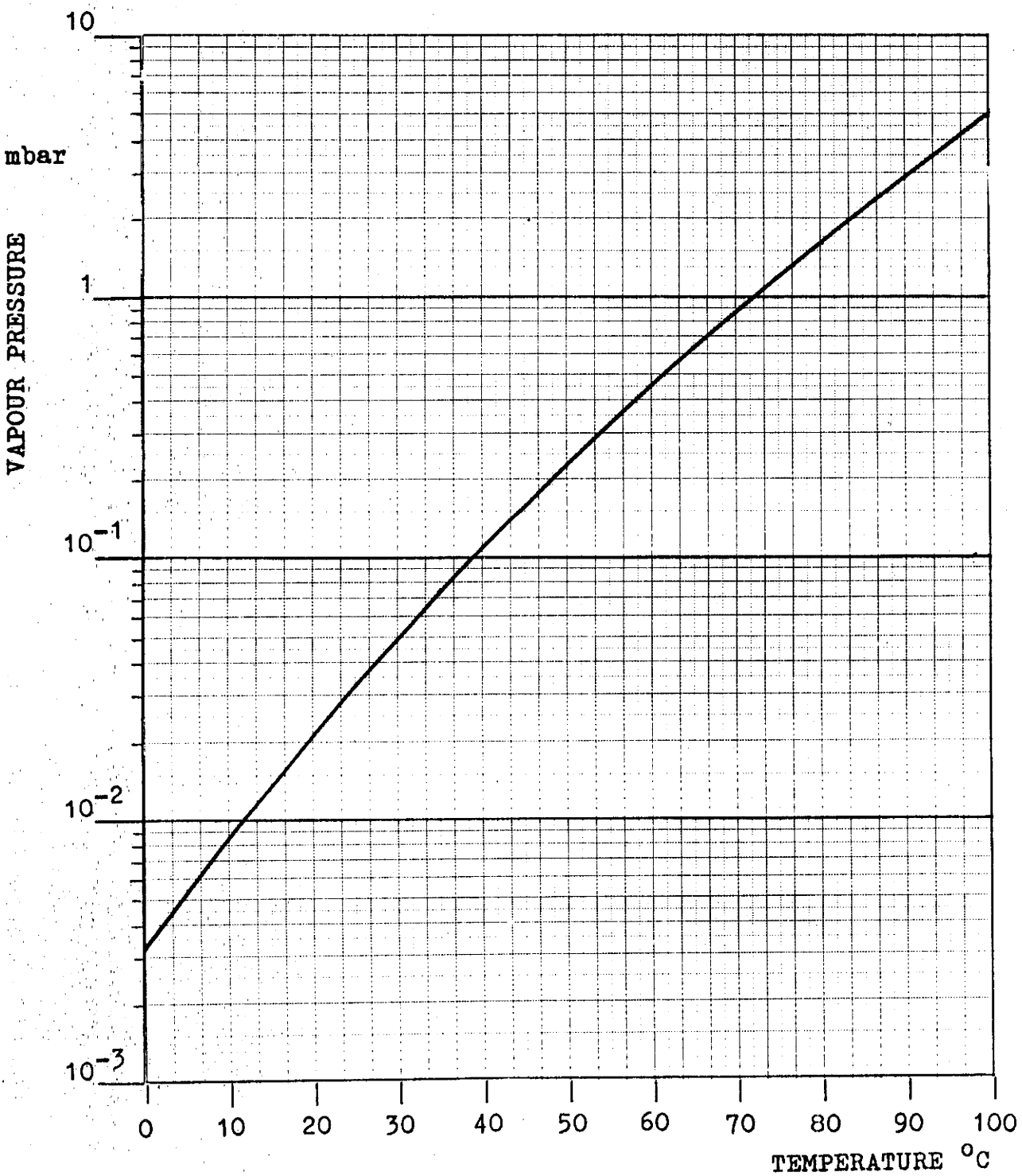
III. Table of

Vapour Pressure vs temperature for *Toluenediisocyanate*

Temperature	Vapour pressure		Concentration of saturated vapours at equilibrium temperature with the air*		
°C	mmHg	mbar	mg/m³	ppm	
0	$2,5 \times 10^{-3}$	$3,33 \times 10^{-3}$	23,0	3,30	
5	$4,1 \times 10^{-3}$	$5,45 \times 10^{-3}$	38,3	5,29	
10	$6,6 \times 10^{-3}$	$8,78 \times 10^{-3}$	60,7	8,38	
15	$1,05 \times 10^{-2}$	$1,40 \times 10^{-2}$	95,1	13,12	
20	$1,6 \times 10^{-2}$	$2,13 \times 10^{-2}$	142,2	19,62	
25	$2,5 \times 10^{-2}$	$3,33 \times 10^{-2}$	218,5	30,15	77°F
30	$3,8 \times 10^{-2}$	$5,05 \times 10^{-2}$	325,9	44,97	86°F
35	$5,6 \times 10^{-2}$	$7,45 \times 10^{-2}$	472,8	65,24	
40	$8,3 \times 10^{-1}$	$1,10 \times 10^{-1}$	687,1	94,82	
45	$1,2 \times 10^{-1}$	$1,6 \times 10^{-1}$	983,4	135,7	
50	$1,7 \times 10^{-1}$	$2,26 \times 10^{-1}$	1368	188,8	
60	$3,4 \times 10^{-1}$	$4,52 \times 10^{-1}$	2655	366	
70	$6,5 \times 10^{-1}$	$8,65 \times 10^{-1}$	4932	681	
80	1,18	1,57	8693	1200	
90	2,2	2,93	15783	2178	
100	3,7	4,92	25798	3560	
110	6,0	7,98	40757	5625	
120	9,6	12,77	63574	8773	
130	15,2	20,22	98057	13532	

*This is the maximum theoretical concentration that could be achieved only in a closed system.

III. Diagram of vapour pressure for Toluene diisocyanate



APPENDIX 2: ACUTE AND SUBACUTE TOXICITY OF TOLUENE (TOLYLENE) DIISOCYANATE - TDI

ACUTE AND SUBACUTE TOXICITY OF TOLUENE (TOLYLENE) DIISOCYANATE - TDI

CONCEPTS OF TOXICITY AND TOXIC HAZARD

The term *toxicity* is generally understood to mean the ability of a substance to induce some harmful effect in living organisms. This effect may result from an intrinsic property of the substance itself or from the activity of breakdown products formed within the organism when the original material is metabolized. Toxic effects can be manifested in many forms, depending on such factors as the route by which the substance entered the organism, the dose received, the frequency of exposure, and the speed with which the organism breaks the substance down or eliminates it. It has been established that each plant or animal species has its own particular response to toxic substances. Mice and rats, for example, may display widely different responses to a given substance. Thus, while toxicity may be considered an intrinsic property of a substance, the actual toxic effect is highly dependent on the species with which the substance interacts.

Toxicity, while a complex property can be characterized as *acute* or *chronic.* Acute toxicity relates to the toxic effect produced by a single contact; chronic toxicity to the toxic effect of repeated contact, possibly over many years. *Subacute* toxicity is less clearly defined; the term generally refers to toxic effects resulting from brief exposure to a substance. It is principally the short-term nature of the contact that distinguishes *subacute* from *chronic* toxicity.

Since different species respond differently to toxic substances, extrapolation of the results of animal experiments to man is extremely difficult. It is particularly important to distinguish between *toxicity* and *toxic hazard,* because the realistic toxic hazard to man is not necessarily related to the intrinsic toxicity of a chemical. A poisonous chemical, carefully stored in an appropriate, properly labeled container and available only to trained personnel, is intrinsically toxic, but is not likely to produce an injury.

Three main factors must be considered in assessing the toxic hazard of a substance: the physical properties of the material, its biological effects, and the "risk analysis". Whenever health or safety standards are to be determined, all three of these factors must be considered.

PHYSICAL PROPERTIES OF TDI THAT ARE IMPORTANT IN TOXIC HAZARD ASSESSMENT

Most of the TDI marketed commercially is a mixture of 80% 2,4-toluene diisocyanate and 20% 2,6-toluene diisocyanate. At room temperature, this mixture is a water-white to pale yellow mobile liquid. The boiling point is 251°C, the flash point 127°C and the fire point 142°C.

TDI has a sharp, pungent odor which can be detected by 50% of people at concentrations as low as 0,05 parts per million (ppm).[1] This characteristic odor and the strong irritating effect of the vapors on the eyes and upper respiratory passages might be expected to alert workers to the presence of excessive concentrations of TDI vapors in the air; however, the detectable level is higher than the current (1979) ceiling of 0,02 ppm specified in the United States by the Occupational Safety and Health Administration (OSHA) and by regulatory agencies in many other countries.

At 25°C, TDI has a low vapor pressure of 3×10^{-3} mbar which corresponds to a concentration of the saturated vapor of about 30 ppm in the atmosphere, but it is an extremely reactive chemical, which requires careful handling. In contact with water it reacts readily, producing heat and forming carbon dioxide and insoluble ureas. The pressure created by the evolved heat and CO_2 is sufficient to rupture a closed container. Contact with compositions containing free hydrogen can produce even more violent reactions.

TDI is incompatible with acids, bases, metal compounds such as copper, zinc and their alloys, surface-active materials, and organometallic catalysts such as mercury and tin compounds.

ACUTE AND SUB-ACUTE TOXICOLOGICAL PROPERTIES

One of the first studies of the effects on man of acute exposure to TDI was published by Fuchs and Valade in 1951.[2] Since that time, more than 100 publications have appeared reporting the results of further studies on both man and animals, many of which were sponsored by the International Isocyanate Institute. These laboratory and clinical studies have yielded a solid body of information on the oral, dermal, and inhalation toxicity of TDI.

Oral toxicity: The dose required to kill 50% of rats tested (LD_{50} value) is 5800 milligrams per kilogram of body weight, which indicates low oral toxicity. Autopsy of the animals showed injury to the stomach lining and possible effects on the liver. Subacute testing involving repeated oral doses indicated the possibility of cumulative effects on the stomach and liver. Ten daily doses of 1500 milligrams of TDI per kilogram of body weight caused 50% of the rats to die.[3]

TDI is not likely to be swallowed in normal operations and is low in oral toxicity, but the material will burn the mucous membrane of the mouth and the linings of the throat and stomach if taken internally and may cause stricture in the throat.

Dermal toxicity: When TDI was applied to the skin of animals in doses as high as 16.000 milligrams per kilogram of body weight (16g/kg), severe local irritation was observed, but none of the animals died.[3] In other animal studies, high doses of TDI injected under the skin caused no observable systemic effects.[2,4,5] However, repeated application of the material to the skin of man and animals may cause sensitization in certain individuals, making them more than normally susceptible to effects from lower doses.[6] Application of TDI to the eyes of rabbits produced marked irritation of the eyelids and mild damage of the cornea unless the eyes were promptly and thoroughly flushed with water.[3] Contact of TDI with eyes causes moderate to severe irritation and can produce corneal injury. Prolonged contact with the skin will cause redness, swelling and blistering and, if such contact is repeated, will produce a burn. The material is not likely to be absorbed through the skin in toxic amounts.

Inhalation toxicity: The primary cause of toxicity by this route is inhalation of TDI droplets or of high concentrations of the vapor. TDI vapor is know to be powerful irritant to the eyes and respiratory tract.[2,3,7] The TDI concentration found to be lethal to 50% of the rats after one hour of exposure (1-hr LC_{50}) was about 89 ppm or 610 milligrams per cubic meter in air.[8,12] Later, when animals were exposed to the saturated vapor for one hour, no deaths occured. The 1-hr LC_{50} is about twice the concentration of the saturated vapor at 25°C.

In man, the vapors are hazardous and irritating to the mucous membrance of both upper and lower respiratory tracts, and short overexposures may result in sinusitis, bronchitis or asthma. Sensitization may occur, resulting in asthma-like responses on subsequent exposure to concentrations below the usual detectable limit. At concentrations of about 0,05 ppm, symptoms may be limited to irritation of the nose and upper respiratory tract, producing excessive nasal secretion and sputum and inducing coughing, which is more severe in smokers than in non-smokers.[18] At a concentration of 1 ppm, similar, but generally more marked symptoms appear. These symptoms, which last for several hours, have been found to be reversible.[19]

Various experimental procedures used over the past 20 years for assessing the subacute inhalation toxicity of TDI have yielded consistent results.[3,9] Subacute exposures have produced tracheobronchitis, bronchitis, emphysema and bronchopneumonia in various experimental animals, the effects varying according to the concentration, the frequency of exposure and the animal species used. The LC_{50} values for mice, rabbits, guinea pigs and rats after 14 days of exposure ranged from 9,7 to 13,9 ppm.[9]

In a recent subacute toxicity study sponsored by the International Isocyanate Institute,[11] groups of rats were exposed repeatedly to 0,19, 0,62 and 2,66 ppm of TDI vapor. In the animals exposed to 0,19 ppm, patches of irritation were observed in the nasal passages, but the lung tissue was normal. Minimal injury to the nasal membranes and slightly abnormal cell growth in the nasal passages were observed in those exposed to 0,62 ppm. Only in the group receiving 2,66 ppm was the whole respiratory tract affected. In animals of this group, some tissue was destroyed in the major passages and matter was exuded from the cells. The no-effect level appeared to be about 0,1 ppm.

In another study sponsored by the I.I.I.,[12] mice, hamsters, and two strains of rats were exposed to 0,1 and 0,3 ppm of TDI vapors for 30 days. No discernable effects were noted in the hamsters, the mice, or the female rats. In some of the male rats there was a weight loss, but this occurred only in animals suffering from an unrelated infection. The infection and weight loss also, occurred in animals of the control group that had not been exposed. One group of the male rats exposed to 0,3 ppm also showed slight respiratory irritation. Other animal studies, however, have shown that exposure to TDI can produce TDI-specific antibodies in the blood.[13]

The mechanism by which man may become sensitized to TDI is still a subject of discussion and controversy. TDI does cause an asthma-like response in certain workers and individuals who have become sensitized are affected by very low concentrations in the air.

The official OSHA exposure limit has been set at a ceiling value of 0,02 ppm, which is below the level people can normally detect. This corresponds to the Threshold Limit Values which have been set or recommended in most industrial countries. The idea that sensitization is an immunological process is supported by the finding of tolylspecific IgE antibodies in the blood serum of hypersensitive persons.[12] There has been no confirmation of the suggestion that TDI may release substances within the body that mimic asthma-like responses.[15] Studies sponsored by the International Isocyanate Institute using isolated lung tissue have shown that TDI does not release bronchoactive substances.[16]

Extreme care must be taken to prevent accidental exposure of workers to the liquid or vapors. The formation of decomposition products is of less concern than the hazard of contact with hot diisocyanate vapors which might give rise to asthma-like attacks. When the material is heated and sprayed in certain processes, the inhalation hazard is increased by aerosol formation.[17]

If TDI is spilled, persons who are not adequately protected may come into direct contact with high concentrations of liquid TDI. If it is not washed from the skin immediately, TDI will produce redness and swelling, although it will not be absorbed in toxic amounts, and sensitization rarely occurs.

If the eyes are splashed with TDI, they should be washed continuously with flowing water for several minutes and medical personnel should be notified immediately.

International Chemical Toxicity Classifications

In many countries, regulations have been formulated or are being considered for the categorization of chemicals in terms of their acute toxic effects. Such systems are intended to furnish guidance to end users and provide codes governing the transportation of chemicals. Classifications of this sort ought to be based on the acute toxic hazard of the substances listed, but often reflect the intrinsic toxicity rather than the toxic hazard.

In the United States, toluene diisocyanate is classified by the Department of Transportation as "Poisonous Liquid Class B."

For many years, the members of the group of experts of the United Nations Economic and Social Council have tried to reach agreement on the criteria for grouping toxic substances, but no consensus has yet been reached. Nevertheless, TDI has been classified by this group as "toxic" and is currently transported as such under various international agreements for transportation of dangerous goods (i.e. IMDG-Code, ADR,RID).

In Europe, Annex VIII of the sixth amendment of the 1967 EEC-Directive on the Packaging and Labeling of Dangerous Substances contains a scheme which categories chemicals as highly toxic, toxic or harmful on the basis of their LD_{50} or LC_{50}. It also provides definitions of irritancy and corrosivity.

The EEC proposal would classify TDI as highly toxic on the basis of its LC_{50}.

EEC toxicity rating	4-hr LC_{50}
Harmful	2 to 20 mg/l
Toxic	0,5 to 2,0 mg/l
Highly Toxic	up to 0,5 mg/l

This classification may be too severe because the low volatility of TDI naturally reduces the practical inhalation hazard.

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APPENDIX 3 : MEDICAL AND FIRST AID RECOMMENDATIONS

MEDICAL AND FIRST AID RECOMMENDATIONS

Medical supervision of all employees who handle or may come into contact with TDI is strongly recommended. The doctor concerned with the medical supervision, especially if he is not a company doctor, should have a knowledge of the health hazards that may result from exposure to TDI (see Section 3).

Medical supervision should include:

a) Pre-employment screening

b) Periodic routine examinations

c) Examination on return to work after sickness absences

d) First aid

a) *Pre-Employment Screening*

This should include a medical history with emphasis on the respiratory system. It is recommended that the modified Medical Research Council (M.R.C.) questionnaire be used.

A clinical examination should include respiratory function tests - minimally the FEV, and FVC should be recorded.

It is recommended that persons with the following conditions be excluded from working with TDI.

Asthmatic-type conditions, chronic bronchitis or other chronic respiratory diseases, recurrent eczema or sensitization conditions of the skin.

At present there is no screening test suitable for detecting persons who may be "susceptible" to TDI.

b) *Period Examinations*

It is thought that a proportion of subjects who become sensitized to TDI will develop symptoms in the first six months. It is recommended that following initial employment, ventilatory capacity tests be performed after two weeks, six weeks and six months. Thereafter tests should be routinely done at six month intervals.

c) *Examination on return to work following sickness absences*

It is prudent to examine all cases of absence due to sickness, especially if related to the respiratory tract to ensure the subjects continued fitness to work with TDI.

d) *First Aid*

In all cases of overexposure to TDI by any route, the affected person should be referred immediately for medical attention. All first aid personnel should be familar with Section 3 of this brochure.

1. *Eye contact*
   If isocyanate has entered the eyes, flush them immediately with water for several minutes.
2. *Skin contact*
   Wash the skin immediately with soap (if available) and water. Remove contaminated clothing and footwear immediately.

   Nb.—All clothing contaminated with TDI should be removed immediately. Clothing should be decontaminated in 8% (dilute) ammonia solution for one hour and then laundered before re-use. (See also Section 3.5.2.1.).
3. *Inhalation*
   This may be either from the vapour or from the aerosol. Remove the affected person to fresh air. Keep at rest.
4. *Ingestion*
   Do not induce vomiting. Give 250 ml of milk or water to drink. Do not give anything by mouth to an unconscious person. (Transfer at once to medical facility for gastric lavage).
5. *Medical advice*
   The main hazard of TDI is from inhalation of vapour or aerosols. Asthmatic type symptoms (broncho-spasm) may develop and symptoms may be delayed for up to 12 hours. Treatment is essentially symptomatic.

   TDI is of low oral toxicity. In the unlikely event of ingestion, the hazard is from inhalation of the vapour during swallowing.

APPENDIX 4 : ANALYTICAL METHODS

SURVEY OF MAJOR CHARACTERISTICS OF EXISTING ANALYTICAL METHODS FOR TDI IN AIR

		Marcali Concept		Meddle & Wood	Paper Tape		Draegeer Tube	Nitro Reagent		Alcohol HPLC Method
		Pilz	HSE		7000	7005		TLC	HPLC	
Simplicity (+/++ = Simple/Very Simple)					++	++	+			
Labour Required (+/++ = Minor/Very Minor)					++	++	+			
Other compounds which can be measured and/or will interfere with TDI Determination)										
MDI		i	i	i	i	i	i	—	—	—
Other Aromatic Isocyanates		i	i	i	i	i	i	—	—	—
Aromatic Amines		i	i	i	—	—	(—)	—	—	—
Water (Vapour)		i	i	i	—	—	i	—	—	—
Solvents		(—)	(—)	(—)	—	—	(—)	—	—	—
Portable kit can be assembled		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Equipment requirements:	Pump	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
	Capacity	1.5	1	5	0.5	0.75	—	0.5	1-2	1-2
	Charger	(—)	(—)	(—)	—	—	—	(—)	(—)	(—)
	Flow Meter	(—)	(—)	(—)	—	—	—	(—)	(—)	(—)
	Impinger	Yes	Yes	Yes	—	—	—	Yes/No	Yes	Yes
	Collection Time (mins)	10	10	100	—	—	10	0.3-2	5-10	5-10
	Volume Collected (1)	10	10	150	—	—	2.5	0.1-1	10-20	10-20
Detection Method		Colourimetric			Colour on Paper		Colour	TLC	HPLC	HPLC
Elapse Time (Sampling — Result)		30	30	10	20	3-4	20	150	150	150
ppb Detectable		0.3	10	10	0-80	0-20	20	2	0.5	0.5
Continuous (C) or Discontinuous (D)		D	D	D	C	C	D	D	D	D
Costs (£) (1979)	Sampling	300	300	300			100	300	300	300
	Detection	300	300	300	£1500	£1500	—	50	3000	3000
		3000	3000	3000						

PILZ/MARCALI

The recommended version of this method is extensively described in a publication which can be obtained from Verlag Chemie, West Germany[1].

The basis principle of the method is the same as described earlier by Marcali[2]. Air is passed through an absorber solution after which the isocyanate is hydrolysed to the corresponding amine. This amine is converted to a coloured complex which is quantitatively measured by UV/visible-spectrophotometer. The modifications introduced by Pilz mainly concern a very effective absorption and ditto hydrolysis[3].

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HSE/MARCALI

The Health and Safety Executive (UK)

Methods for the Detection of Toxic Substances in Air
Booklet No. 20 Aromatic Isocyanates

The above method is based on the trapping of the isocyanate in an acid medium followed by a subsequent reaction to form a coloured derivative: Marcali principle [1]. This coloured solution is then measured, by means of a comparator disc (for TDI, MDI and NDI) or spectroscopically (for any unreacted aromatic isocyanate). The sampling procedure and measurement can be easily carried out by a competant unskilled person although some analytical expertise is required for the preparation of standard graphs, if required. The Booklet Method is based on the sampling of 10.1 of air over a 10 minute period and can detect down to 0.01 ppm using the comparator discs [2]. Based on a 10 minute sample, a result is usually available with 30 minutes. All of the reagents and apparatus required are cheap and commercially available and a complete kit can be assembled for under £100.

This method will also give a response to aromatic primary amines but a procedure is described in the Booklet to overcome this problem and give a measure for the isocyanate alone [3]. The full experimental details can be obtained from the above publication, obtainable from

Government Bookshop
P.O. Box 569
London SE1 9NH
England

or through other booksellers, Price 45 p (by post 52p).

The comparator discs for TDI containing coloured glass standards for this test, for use with the Lovibond "1000" Comparator, are available from Tintometer Ltd., Salisbury, England.

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M & W / MARCALI

The traces of isocyanates in ambient air (MDI, TDI and PhI) are absorbed in a mixture of dimethylformamide and hydrochloric acid (absorption solution 1) and thereby transformed to the corresponding amines. These aromatic amines are diazotised and coupled with N-2-aminoethyl-1-naphthylamine, commonly known as N-(1-naphthyl) ethylenediamine. The resultant violet coloration is measured colorimetrically.

Interferring free aromatic primary amines (e.g. catalysts) are determined by blocking the isocyanates with hexamethylendiamine (absorption solution 2), which forms the urea. The isocyanate content is calculated as the difference between simultaneous measurements made on solutions 1 and 2.

The scope of this method is the determination of traces of MDI, TDI and PhI, as vapours or aerosols in laboratories, workshops and production plants. Blocked isocyanates and prepolymers with available isocyanate groups are also detected. The tested range lies between 10 and 200 ppb. The limit of detection is between 5 and 10 ppb. Absorbing larger volumes of air (up to 1 m^3) over longer period of time gives lower detection limits.

Literature:

[1] Meddle, D.W. Radford, D.W. Wood, R. Analyst *94,* 369 (1969)

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[3] Health & Safety Executive, HM Factory Inspectorate, Methods for the Detection of Toxic Substances in Air; Booklet No. 20, Aromatic Isocyanates

TLC (Thin Layer Chromatography) [1]

An air sample is passed through a solution of N-4-nitro-benzyl-N-n-propylamine (nitroreagent) in toluene, in which the isocyanates to be determined and the aromatic amines are absorbed. After careful evaporation of the solution to 1 ml, the ureas formed from isocyanates and nitroreagent, and the aromatic amines are determined by thin-layer-chromatography.

[1] Keller, J. Dunlap, K.L. and Sandrige, R.L. Anal. Chem. *46,* 1845 (1974).

MDA 7000/MDA 7005; THE PAPER TAPE MONITORS

Utilizing a reel of paper impregnated with specific reagents a continuous isocyanate monitor is available. In operation, a cassette of this paper is pulled past an exposure orifice. A sample of air is aspirated through the tape by means of a self-contained pump, flow meter and flow controller. After exposure, the tape continues to move to the readout section where the tape is illuminated. Matched photo detectors measure the reflected light from the exposed and unexposed parts of the tape. This difference in reflected light produces a signal related to vapour concentration. The model 7000 has a dynamic range of 0-0,08 ppm. Both audio and visual alarms are incorporated into the unit. This paper tape system has the advantages of being a dry system, thus eliminating the handling of liquids at all stages; the tape is specific to isocyanates (TDI and MDI - although a correction factor is required for MDI) and does not react with aromatic amines. The life time of the test paper is approximately 4 months and the time interval required from initial exposure to complete development of the stain is approximately 20 minutes.

A modified version, the Model 7005 has been introduced. The response of this version to both aromatic and aliphatic isocyanates is very rapid, giving a result (at the 0,02 ppm level) in 3-4 minutes.

Further assessment and development work is in hand to extend and improve its performance.

Both, the Model 7000 and 7005, are easy to operate by relatively unskilled persons.

Further information and equipment can be obtained from:
MDA Scientific, INC., 808 BUSSE HIGHWAY, PARK RIDGE, ILLINOIS 60068, USA (312) 696-4250 Telex: 28-3469 MDA-PRID.

DRAEGER TUBE

The Draeger gas detector consists of the combination Draeger tube plus Draeger pump which must be used together. The gas detector pump is a handoperated bellows pump which samples 100 ml with each stroke and hence acts as both a pump and volume measuring device. The tolylene diisocyanate Draeger tube will measure down to 0.02 ppm v/v with 25 strokes of the pump. The TDI Draeger tubes should only be used to give a general indication that concentrations of isocyanate in excess of the TLV are present. The system is simple to use and gives immediate results. The cost of the pump is approximately £50 and the tubes less than £1. information available from:

Draegerwerk AG
Postfach 1339
Moislinger Allee 53/55
D-2400 Lubeck 1
West Germany

and their representatives in different countries.

A new sampling technique has been developed in which a small volume of air is drawn through a tube containing "nitro reagent" on a suitable support. The stable urea derivative which is formed is eluted from the tube and deposited on a thin-layer plate for subsequent analysis. Since the entire sample is utilized, the sampling time can be markedly shortened, making measurement possible for time periods of 2 minutes or less.

Anal. Chem. Vol 51, No. 11, September 1979

HPLC NITRO REAGENT METHOD

This is based on the simultaneous trapping and derivativization of the isocyanate in a solution of the nitroreagent (N-4-nitrobenzyl-N-N-propylamine) followed by a subsequent pre-concentration stage and HPLC with this method, the isocyanates can be qualitatively identified by their elution times and quantitivately determined by their peak areas. The nitroreagent method is capable of measuring isocyanates at levels well below the current TLV. The operation of this method requires a high degree of analytical skill and sophisticated analytical equipment.

Anal. Chem. Vol. 48, No. 3, March 1976.

HPLC ALCOHOL METHOD

This is based on the simultaneous trapping and derivativization of the isocyanate in absolute alcohol followed by a subsequent pre-concentration stage and HPLC as with the nitroreagent method. The isocyanates can be qualitatively identified by their elution time and quantitatively determined by their peak areas. The absolute alcohol method is capable of measuring isocyanates at levels well below the current TLV. It is only applicable to aromatic isocyanates. The operation of this method requires a high degree of analytical skill and sophisticated analytical equipment.

APPENDIX 5 : DRUM DECONTAMINATION

DECONTAMINATION OF ISOCYANATE DRUMS

Isocyanates or isocyanate prepolymers may be delivered in drums. These drums are designed to be one way-packages and can therefore not be taken back by the suppliers.

Isocyanate residues will remain on the walls of depleted drums and the precautions associated with handling isocyanates will apply. Therefore it is not permissible to re-use or to dispose of emptied isocyanate drums unless they are decontaminated completely, which should be done as soon as practicable after emptying.

All decontamination must be carried out in properly ventilated areas and all personnel protected from the inhalation hazards of isocyanate vapours. The work place atmosphere standards for isocyanates (0,02 ppm, C) should be strictly observed.

Experiments have shown that the following decontamination solutions can be used

a) Water	90 to 95%
liquid detergent	0,2 to 0,5%
conc. ammonia or other basic reacting agent	3 to 8%

b) 2-ethoxyethanol *

* Alternative chemical name = Ethylene glycol monoethyl ether

The following decontamination procedure has been proven to be effective for emptied out and well drained isocyanate drums:

1. Spray or pour 5 to 25 litres of decontamination solution into the drum making sure the walls are well rinsed. This can be achieved by use of a spray head or by rolling the drum for several minutes.
2. Leave drum standing unsealed for 24 hours to allow complete reaction. Sealing of the drum must be avoided to prevent build up of pressure by evolved carbon dioxide.
3. Pour out liquid decontaminant into storage vessel. This solution can be used several times.

Disposal of liquid decontaminant should only be carried out in accordance with local, regional and national regulations.

Only properly decontaminated isocyanate drums may be disposed of or be used as containers for other wastes.

Drums that are to be re-used otherwise should be free of any solid residues and this can be achieved by solution b).

In no case must decontaminated or otherwise properly cleaned drums be used for foodstuffs or food additives.

APPENDIX 6: WORKPLACE ATMOSPHERE STANDARDS FOR TDI IN VARIOUS COUNTRIES

WORKPLACE ATMOSPHERE STANDARDS FOR TOLUENE DIISOCYANATE (TDI) IN VARIOUS COUNTRIES - THRESHOLD LIMIT VALUE - CEILING (TLV-C)*

	* mg/m³	* ppm
Australia	0,14	0,02
Belgium	0,14	0,02
Denmark	0,07**	0,01**
Finland	0,14	0,02
Italy	0,14	0,02
Japan	0,14	0,02
Yugoslavia	0,14	0,02
Netherlands	0,14	0,02
Norway	0,07**	0,01**
Switzerland	0,14	0,02
Sweden	0,07	0,01
W. Germany	0,14	0,02
USA (ACGIH)	0,14	0,02

** These figures reflect the status as of fall, 1980

4.05 Particle Size -- If the listed substance exists in particulate form during any of the following activities, indicate for each applicable physical state the size and the percentage distribution of the listed substance by activity. Do not include particles ≥10 microns in diameter. Measure the physical state and particle sizes for importing and processing activities at the time you import or begin to process the listed substance. Measure the physical state and particle sizes for manufacturing storage, disposal and transport activities using the final state of the product.

CBI

[ ]

Physical State		Manufacture	Import	Process	Store	Dispose	Transport
Dust	<1 micron	NA					
	1 to <5 microns						
	5 to <10 microns						
Powder	<1 micron						
	1 to <5 microns						
	5 to <10 microns						
Fiber	<1 micron						
	1 to <5 microns						
	5 to <10 microns						
Aerosol	<1 micron						
	1 to <5 microns						
	5 to <10 microns						

[ ] Mark (X) this box if you attach a continuation sheet.

PART B FIRE, EXPLOSION, AND OTHER HAZARD DATA

4.06 For each physical state of the listed substance, specify the corresponding flashpoint, and the test method used to derive the flashpoint value.

Solid

Flashpoint ..... NA °C

Test method ..... _____

Liquid

Flashpoint ..... 127 °C

Test method ..... PENSKY-MARTENS CLOSED CUP

Gas/Vapor

Flashpoint ..... _____ °C

Test method ..... _____

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes 1

No ..... (2)

4.07 Indicate the temperature at which the listed substance undergoes autopolymerization or autodecomposition.

Autopolymerizes at ..... 177 °C

Autodecomposes at ..... _____ °C

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes 1

No ..... (2)

[ ] Mark (X) this box if you attach a continuation sheet.

4.08 Indicate the flammable limits in air (% by volume) for the listed substance at standard temperature and pressure.

Lower limit ..... 0.9 %

Upper limit ..... 9.5 %

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes 1

No ..... (2)

[ ] Mark (X) this box if you attach a continuation sheet.

4.09 Extinguishing Media -- Identify (Y/N/NA/UK) all known methods for extinguishing flames caused by each product type which contains the listed substance. (Refer to the instructions for the definition of Y, N, NA and UK.)

Extinguishing Media	Product Types Containing the Listed Substance[1] 1	2	3	4	5	6
Water	Y	Y				
Foam	Y	Y				
CO_2	Y	Y				
Dry chemical (e.g., sodium bicarbonate)	Y	Y				
Halogenated hydrocarbon (e.g., carbon tetrachloride, methyl bromide)	UK	UK				
Other (specify) _____						

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes 1

No ..... (2)

---

[1]Identify the product types listed under each column (1-6) in the following table:

Product Type No.	Product Type Identity
1	TOLUENE DIISOCYANATE
2	NAFIL RESIN FP-6403
3	
4	
5	
6	

[ ] Mark (X) this box if you attach a continuation sheet.

4.10 Special Firefighting Procedures -- Identify (Y/N/NA/UK) all known restrictions on firefighting procedures used to combat fires caused by each product type which contains the listed substance. (Refer to the instructions for definitions of Y, N, NA and UK.)

Special Firefighting Procedures	Product Types Containing the Listed Substance[1]					
	1	2	3	4	5	6
Do not use water	NA					
Do not increase air pressure						
Other (specify) _____						

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes ..... (1)

No 2

---

[1]Identify the product types listed under each column (1-6) in the following table:

Product Type No.	Product Type Identity
1	TOLUENE DIISOCYANATE
2	NAFIL RESIN FP-6403
3	
4	
5	
6	

[ ] Mark (X) this box if you attach a continuation sheet.

4.11 Incompatibility -- List all chemicals, materials, or categories of chemicals or materials that you know are incompatible with the listed substance and the reason why they are incompatible. (Refer to the instructions for further explanation and an example.)

CAS No.	Name	Reaction (specify)
	NA	

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes ..... (1)

No 2

4.12 Autoxidation -- Is the listed substance capable of autoxidation? Circle the appropriate response.

Yes 1

(No) 2

Unknown 3

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[ ] Mark (X) this box if you attach a continuation sheet.

4.13 Indicate the autoignition temperature for the listed substance and the test method used to derive this value.

Autoignition temperature ..... _____ °C

Test method ..... _____

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

4.14 Vapor in Cargo Tanks -- If storing the listed substance in a cargo tank causes vapor problems, such as peroxide formation, reaction with moisture, etc., specify the problem and necessary controls or restrictions used to remedy each problem.

Vapor Problem	Controls/Restrictions
Peroxide formation	
Reaction with moisture	
Combustion	
Other (specify)	

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[ ] Mark (X) this box if you attach a continuation sheet.

4.15 Shipment Procedures -- If you use an inhibitor or stabilizer when shipping the listed substance in bulk form, specify its name, whether it inhibits or stabilizes the listed substance, the amount normally added, and the duration of its effectiveness.

CBI

[ ]

Name of Additive	Inhibitor or Stabilizer[1]	Amount Normally Added (ppm or %)	Duration of Effectiveness (specify units)

Indicate if hazard information/MSDS has been submitted in lieu of response by circling the appropriate response.

Yes ..... (1)

No 2

[1]Use the following codes to designate inhibitor and stabilizer:

I = Inhibitor
S = Stabilizer

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 5 ENVIRONMENTAL FATE

PART A RATE CONSTANTS AND TRANSFORMATION PRODUCTS

5.01 Indicate the rate constants for the following transformation processes.

a. Photolysis:

Absorption spectrum coefficient (peak) .... UK (1/M cm) at _____ nm

Reaction quantum yield, ϕ ..... UK at _____ nm

Direct photolysis rate constant, k_p, at ... UK 1/hr _____ latitude

b. Oxidation constants at 25°C:

For $^1O_2$ (singlet oxygen), k_{ox} ..... UK 1/M h

For RO_2 (peroxy radical), k_{ox} ..... UK 1/M h

c. Five-day biochemical oxygen demand, BOD_5 ... UK mg/l

d. Biotransformation rate constant:

For bacterial transformation in water, k_b... UK 1/hr

Specify culture ..... UK

e. Hydrolysis rate constants:

For base-promoted process, k_B ..... UK 1/M h

For acid-promoted process, k_A ..... UK 1/M h

For neutral process, k_N ..... UK 1/hr

f. Chemical reduction rate (specify conditions) UK

g. Other (such as spontaneous degradation) ... UK

[ ] Mark (X) this box if you attach a continuation sheet.

PART B PARTITION COEFFICIENTS

5.02 a. Specify the half-life of the listed substance in the following media.

Media	Half-life (specify units)
Groundwater	UK
Atmosphere	UK
Surface water	UK
Soil	UK

b. Identify the listed substance's known transformation products that have a half-life greater than 24 hours.

CAS No.	Name	Half-life (specify units)	Media
	UK		in
			in
			in
			in

5.03 Specify the octanol-water partition coefficient, K_{ow} ... UK at 25°C

Method of calculation or determination .....

5.04 Specify the soil-water partition coefficient, K_d ..... UK at 25°C

Soil type .....

5.05 Specify the organic carbon-water partition coefficient, K_{oc} ..... UK at 25°C

5.06 Specify the Henry's Law Constant, H ..... UK atm-m^3/mole

[ ] Mark (X) this box if you attach a continuation sheet.

5.07 List the bioconcentration factor (BCF) of the listed substance, the species for which it was determined, and the type of test used in deriving the BCF.

Bioconcentration Factor	Species	Test[1]
UK		

[1]Use the following codes to designate the type of test:

F = Flowthrough
S = Static

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 6 ECONOMIC AND FINANCIAL INFORMATION

6.01 Company Type -- Circle the number which most appropriately describes your company.

CBI

[ ]

Corporation ..... (1)

Sole proprietorship 2

Partnership 3

Other (specify) _____ 4

6.02 At the end of the reporting year, were you constructing additional facilities at this site that were not yet in operation at the end of the reporting year, but which are now being used or will be used in the future for manufacturing, importing, or processing the listed substance? Circle the appropriate response.

CBI

[ ] Yes 1

No ..... (2)

6.03 List all of the product types that you manufacture that contain the listed substance as a raw material, and the percentage of the name-plate capacity dedicated to the listed substance that each product type represents. The total of all capacity percentiles should equal 100 percent. State the total name-plate capacity of the process type(s) used to manufacture all product types that contain the listed substance.

CBI

[ ]

Product Type	% Total Capacity
NAFIL RESIN FP-6403	BATCH

State the total name-plate capacity of the process type(s) used to manufacture all product types that contain the listed substance: BATCH kg/yr

[ ] Mark (X) this box if you attach a continuation sheet.

6.04 CBI [ ] For each market listed below, state the quantity sold and the total sales value of the listed substance sold or transferred in bulk during the reporting year.

Market	Quantity Sold or Transferred (kg/yr)	Total Sales Value ($/yr)
Retail sales	NONE	
Distribution -- Wholesalers	NONE	
Distribution -- Retailers	NONE	
Intra-company transfer	NONE	
Repackagers	NONE	
Mixture producers	NONE	
Article producers	287,854	$1,000,500.00
Other chemical manufacturers or processors	NONE	
Exporters	NONE	
Other (specify)		
_____	NONE	

1.58

6.05 CBI [ ] Substitutes -- List all known commercially feasible substitutes that you know exist for the listed substance and state the cost of each substitute. A commercially feasible substitute is one which is economically and technologically feasible to use in your current operation, and which results in a final product with comparable performance in its end uses.

Substitute	Cost ($/kg)
MONDUR DIISOCYANATE, POSSIBLY	$2.35 APPROX.

[ ] Mark (X) this box if you attach a continuation sheet.

6.06 CBI [ ] State your average total and variable costs of manufacturing, importing, and processing the listed substance during the reporting year. (For an explanation of these costs, refer to the instructions.)

Average Total Costs

Manufacturing	—	$/kg
Importing	—	$/kg
Processing	$1.1735 lb.	$/kg

Average Variable Costs

Manufacturing	—	$/kg
Importing	—	$/kg
Processing	1.064 lb.	$/kg

6.07 State your average purchase price of the listed substance, if purchased as a raw material during the reporting year.

CBI

[ ] Average purchase price ..... $1.11 lb $/kg

6.08 CBI State your company's total sales and sales of the listed substance sold in bulk for the reporting year.

[ ] Year ending ..... NOT SOLD IN BULK ..... [1][2] Mo. [8][8] Year

Company's total sales ($) ..... Na

Sales of listed substance ($) ..... Na

[ ] Mark (X) this box if you attach a continuation sheet.

6.09 CBI [ ]

State your company's total sales and sales of the listed substance sold in bulk for the corporate fiscal year preceding the reporting year. (Refer to the instructions for question 6.08 for the methodology used to answer this question.)

Year ending ...NOT SOLD IN BULK..... [ ][ ] Mo. [ ][ ] Year

Company's total sales ($) ..... NA

Sales of listed substance ($) ..... NA

6.10 CBI [ ]

State your company's total sales and sales of the listed substance sold in bulk for the 2 corporate fiscal years preceding the reporting year in descending order. (Refer to the instructions for question 6.08 for the methodology used to answer this question.)

Year ending ...NOT SOLD IN BULK..... [ ][ ] Mo. [ ][ ] Year

Company's total sales ($) ..... NA

Sales of listed substance ($) ..... NA

Year ending ..... [ ][ ] Mo. [ ][ ] Year

Company's total sales ($) ..... NA

Sales of listed substance ($) ..... NA

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 7 MANUFACTURING AND PROCESSING INFORMATION

General Instructions:

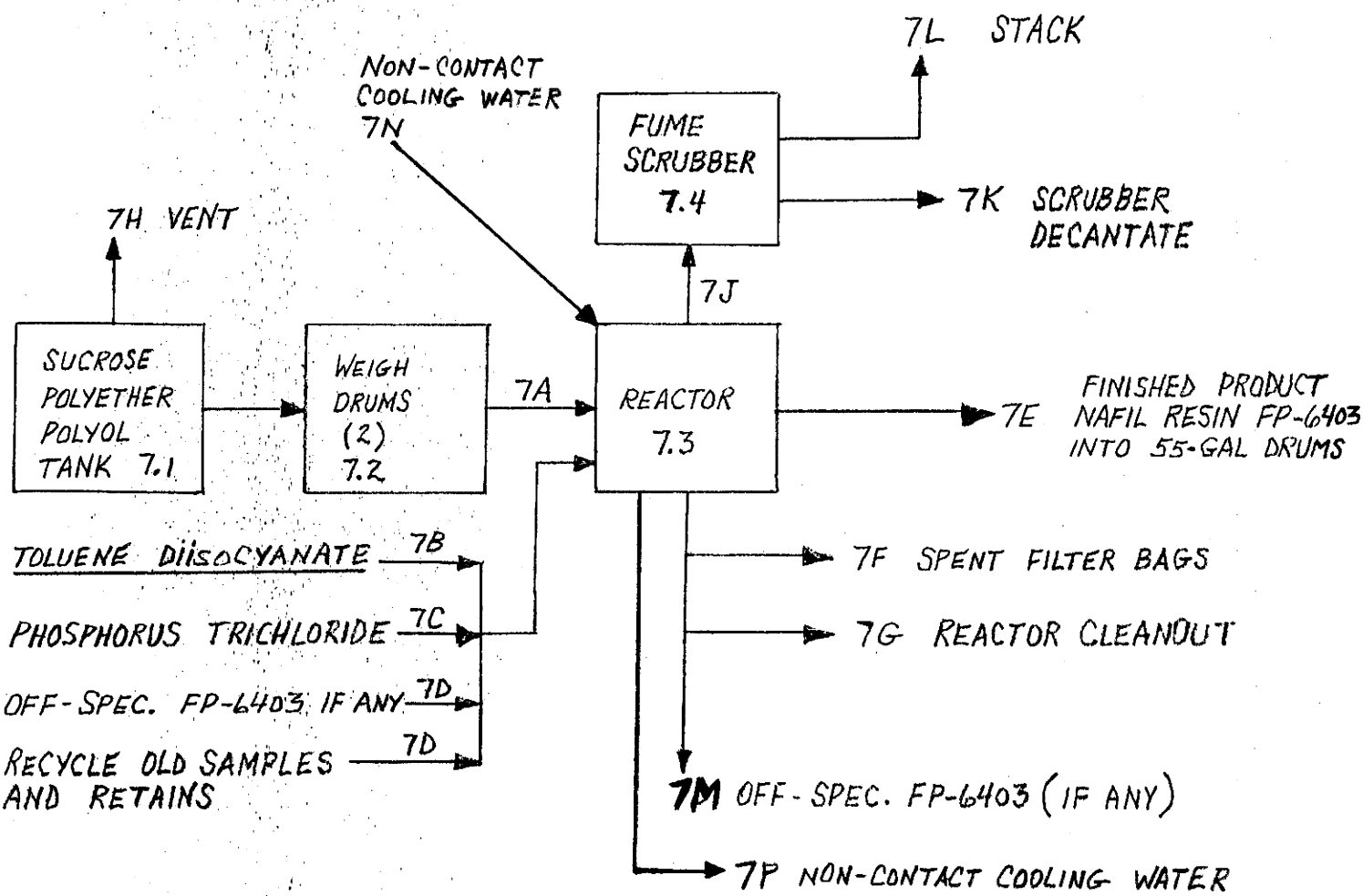
For questions 7.04-7.06, provide a separate response for each process block flow diagram provided in questions 7.01, 7.02, and 7.03. Identify the process type from which the information is extracted.

PART A MANUFACTURING AND PROCESSING PROCESS TYPE DESCRIPTION

7.01 In accordance with the instructions, provide a process block flow diagram showing t major (greatest volume) process type involving the listed substance.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS



[ ] Mark (X) this box if you attach a continuation sheet.

7.02 In accordance with the instructions, provide a separate process block flow diagram showing each of the three major (greatest volume) process types involving the listed substance.

CBI

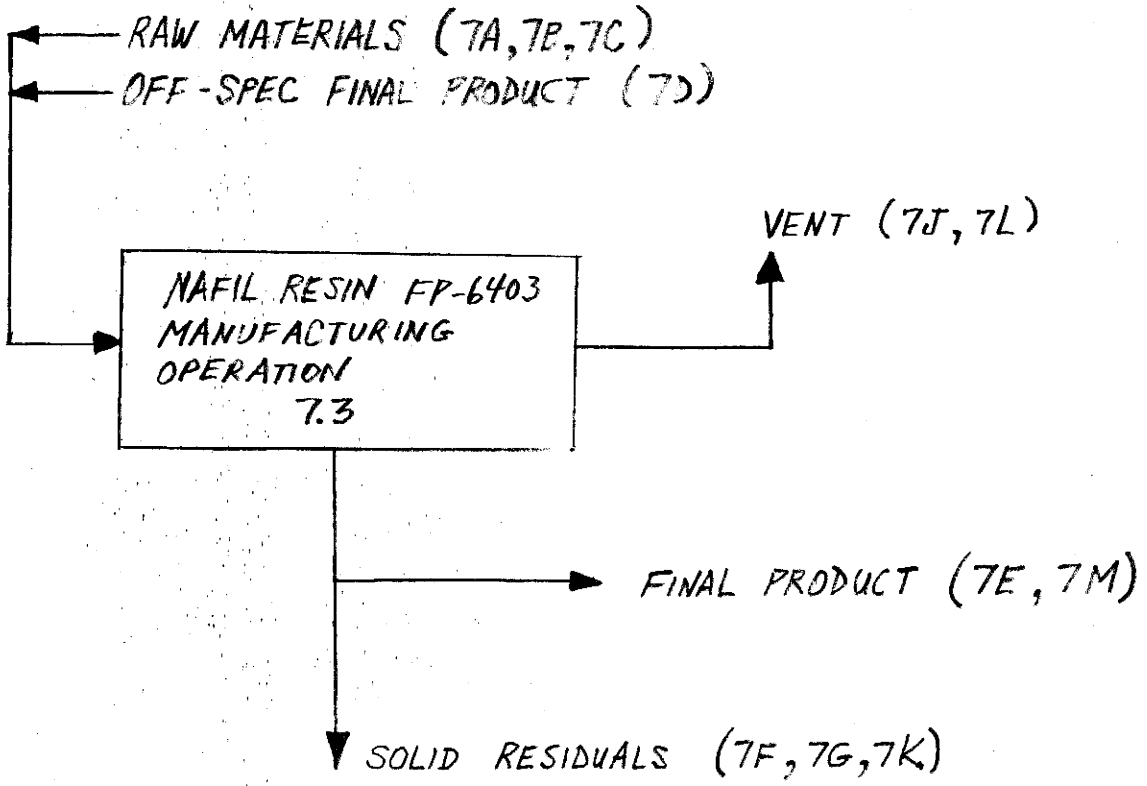
[ ] Process type ..... ONE PROCESS TYPE USED.
REFER TO 7.01

[ ] Mark (X) this box if you attach a continuation sheet.

7.03 In accordance with the instructions, provide a process block flow diagram showing all process emission streams and emission points that contain the listed substance and which, if combined, would total at least 90 percent of all facility emissions if not treated before emission into the environment. If all such emissions are released from one process type, provide a process block flow diagram using the instructions for question 7.01. If all such emissions are released from more than one process type, provide a process block flow diagram showing each process type as a separate block.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS



[ ] Mark (X) this box if you attach a continuation sheet.

7.04 Describe the typical equipment types for each unit operation identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Unit Operation ID Number	Typical Equipment Type	Operating Temperature Range (°C)	Operating Pressure Range (mm Hg)	Vessel Composition
7.1	STORAGE TANK	AMBIENT	ATMOSPHERIC	STEEL
7.2	WEIGH DRUM	AMBIENT	ATMOSPHERIC	STEEL
7.3	REACTOR	AMBIENT - 63°	ATMOSPHERIC	STEEL
7.4	FUME SCRUBBER	AMBIENT	1035 mm	STEEL

[ ] Mark (X) this box if you attach a continuation sheet.

7.05 Describe each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Process Stream ID Code	Process Stream Description	Physical State[1]	Stream Flow (kg/yr)
7A	POLYOL REACTANT	OL	71,803
7B	TOLUENE DIISOCYANATE	OL	287,106
7C	PCl_3 CATALYST	IL	15
7D	OFF-SPEC. FP-6403 RESIN	OL	16553
7E	NAFIL RESIN FP-6403	OL	363361
7F	SPENT FILTER BAGS	SO	12
7G	REACTOR CLEANOUT	SO	204
7H	POLYOL TANK VENT	GU	UK

[1]Use the following codes to designate the physical state for each process stream:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

[X] Mark (X) this box if you attach a continuation sheet.

7.05 Describe each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS CON'T.

Process Stream ID Code	Process Stream Description	Physical State[1]	Stream Flow (kg/yr)
7J	REACTOR VENT	GU	UK
7K	SCRUBBER LIQUOR (WATER)	SY	78,593
7L	SCRUBBER STACK	GU	UK
7M	OFF-SPEC. FP-6403 RESIN	OL	16553
7N	NON-CONTACT COOLING WATER	AL	1,400,000
7P	NON-CONTACT COOLING WATER	AL	1,400,000

[1] Use the following codes to designate the physical state for each process stream:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

[ ] Mark (X) this box if you attach a continuation sheet.

7.06 Characterize each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the CBI instructions for further explanation and an example.)

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

a. Process Stream ID Code	b. Known Compounds[1]	c. Concentrations[2,3] (% or ppm)	d. Other Expected Compounds	e. Estimated Concentrations (% or ppm)
7A	SUCROSE POLYETHER POLYOL C.A.S. 9049-71-2	100% (A)(W)	NONE	
7B	TOLUENE DIISOCYANATE C.A.S. 26471-62-5	100% (A)(W)	NONE	
7C	PHOSPHORUS TRICHLORIDE CATALYST	100% (A)(W)	NONE	

7.06 continued below

[X] Mark (X) this box if you attach a continuation sheet.

7.06 Characterize each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the CBI instructions for further explanation and an example.)

[ ] Process type ..... CON'T.

a. Process Stream ID Code	b. Known Compounds[1]	c. Concentrations[2,3] (% or ppm)	d. Other Expected Compounds	e. Estimated Concentrations (% or ppm)
7D	NAFIL RESIN FP-6403	33%(E)(W)	NONE	
	CA.S. 59154-64-2			
	TOLUENE DIISOCYANATE	77%(E)(W)		
	CAS. 26471-62-5			
7E	NAFIL RESIN FP-6403	33%(E)(W)	NONE	
	CA.S. 59154-64-2			
	TOLUENE DIISOCYANATE	77%(E)(W)		
	C.A.S. 26471-62-5			
7F	NAFIL RESIN FP-6403	33%(E)(W)	UREA	UK
	CA.S. 59154-64-2			
	TOLUENE DIISOCYANATE	77%(E)(W)		
	C.A.S. 26471-62-5			

7.06 continued below

[X] Mark (X) this box if you attach a continuation sheet.

7.06 Characterize each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the CBI instructions for further explanation and an example.)

[ ] Process type ..... CON'T.

a. Process Stream ID Code	b. Known Compounds[1]	c. Concentrations[2,3] (% or ppm)	d. Other Expected Compounds	e. Estimated Concentrations (% or ppm)
7G	INSOLUBLE UREAS - IDENTITY UNKNOWN.	UK	UK	UK
7H	AIR	UK		
	WATER VAPOR			
7J	TOLUENE DIISOCYANATE	UK	UK	UK

7.06 continued below

[X] Mark (X) this box if you attach a continuation sheet.

7.06 Characterize each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the CBI instructions for further explanation and an example.)

[ ] Process type ..... CON'T.

a. Process Stream ID Code	b. Known Compounds[1]	c. Concentrations[2,3] (% or ppm)	d. Other Expected Compounds	e. Estimated Concentrations (% or ppm)
7K	WATER	UK	UK	
	INSOLUBLE UREAS	UK	UK	
7L	AIR	UK	NONE	
	WATER VAPOR	1.4% (A)(W)		
	2,4-TOLUENE DIISOCYANATE	0.012 ppm (A)(V)		
	2,6-TOLUENE DIISOCYANATE	0.005 ppm (A)(V)		
7M	NAFIL RESIN FP-6403	33% (E)(W)	NONE	
	C.A.S. 59154-64-2			
	TOLUENE DIISOCYANATE	77% (E)(W)	NONE	
	C.A.S. 26471-62-5			

7.06 continued below

[X] Mark (X) this box if you attach a continuation sheet.

7.06 Characterize each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the CBI instructions for further explanation and an example.)

[ ] Process type ..... CON'T.

a. Process Stream ID Code	b. Known Compounds[1]	c. Concentrations[2,3] (% or ppm)	d. Other Expected Compounds	e. Estimated Concentrations (% or ppm)
7N	WATER	100%	NONE	
7P	WATER	100%	NONE	

7.06 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

7.06 (continued)

[1]For each additive package introduced into a process stream, specify the compounds that are present in each additive package, and the concentration of each component. Assign an additive package number to each additive package and list this number in column b. (Refer to the instructions for further explanation and an example. Refer to the glossary for the definition of additive package.)

Additive Package Number	Components of Additive Package	Concentrations (% or ppm)
1	NONE	
2		
3		
4		
5		

[2]Use the following codes to designate how the concentration was determined:

A = Analytical result
E = Engineering judgement/calculation

[3]Use the following codes to designate how the concentration was measured:

V = Volume
W = Weight

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 8 RESIDUAL TREATMENT GENERATION, CHARACTERIZATION, TRANSPORTATION, AND MANAGEMENT

General Instructions:

For questions 8.04-8.06, provide a separate response for each residual treatment block flow diagram provided in question 8.01, 8.02 or 8.03. Identify the process type from which the information is extracted.

For questions 8.05-8.33, the Stream Identification Codes are those process streams listed in either the Section 7 or Section 8 block flow diagrams which contain residuals for each applicable waste management method.

For questions 8.07-8.33, if residuals are combined before they are handled, list those Stream Identification Codes on the same line.

Questions 8.09-8.33 refer to the waste management activities involving the residuals identified in either the Section 7 or Section 8 block flow diagrams. Not all Stream Identification Codes used in the sample answers (e.g., for the incinerator questions) have corresponding process streams identified in the block flow diagram(s). These Stream Identification codes are for illustrative purposes only.

For questions 8.11-8.33, if you have provided the information requested on one of the EPA Office of Solid Waste surveys listed below within the three years prior to your reporting year, you may submit a copy or reasonable facsimile in lieu of answering those questions which the survey addresses. The applicable surveys are: (1) Hazardous Waste Treatment, Storage, Disposal, and Recycling Survey; (2) Hazardous Waste Generator Survey; or (3) Subtitle D Industrial Facility Mail Survey.

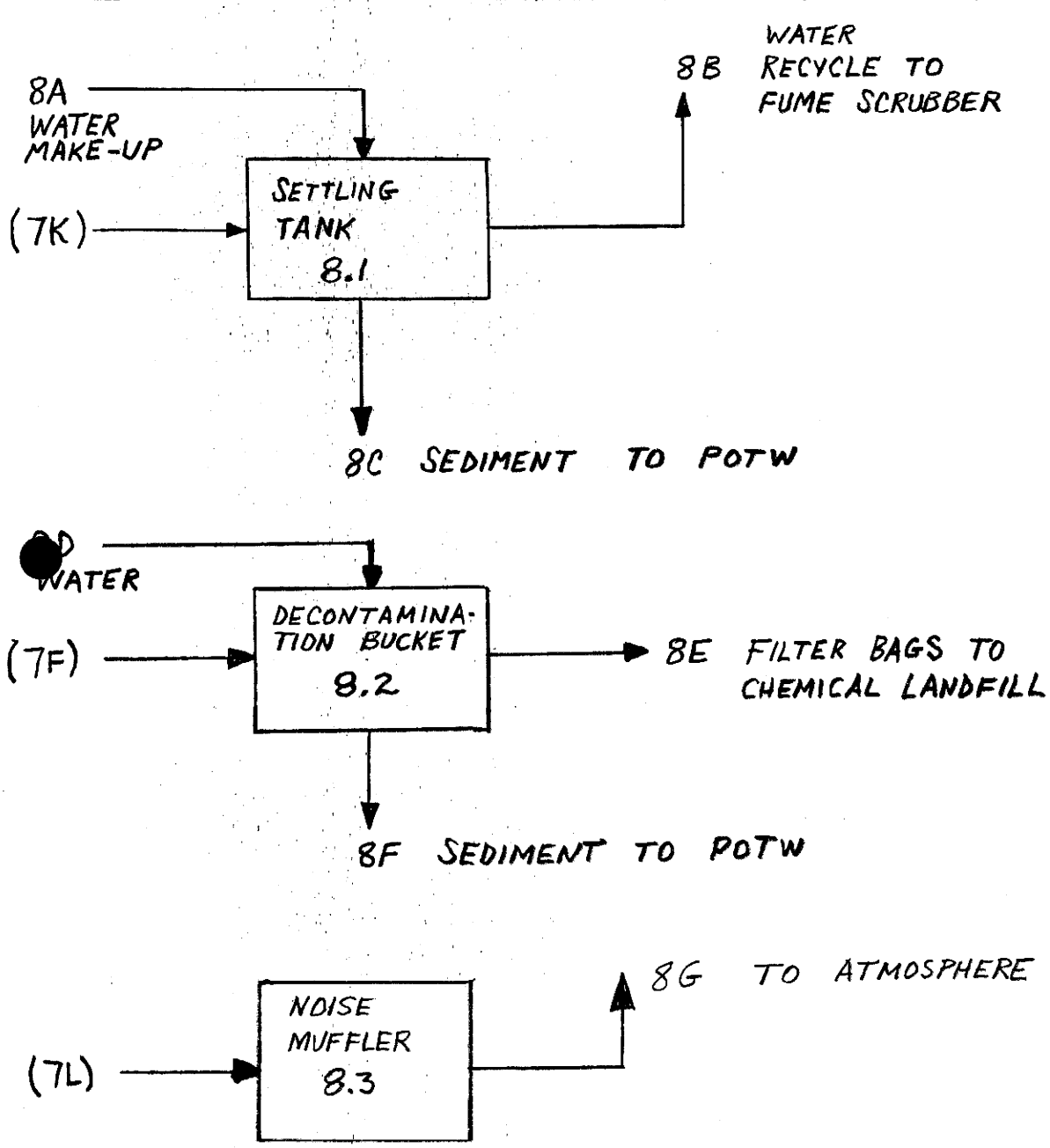
[ ] Mark (X) this box if you attach a continuation sheet.

PART A RESIDUAL TREATMENT PROCESS DESCRIPTION

8.01 In accordance with the instructions, provide a residual treatment block flow diagram which describes the treatment process used for residuals identified in question 7.01.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS



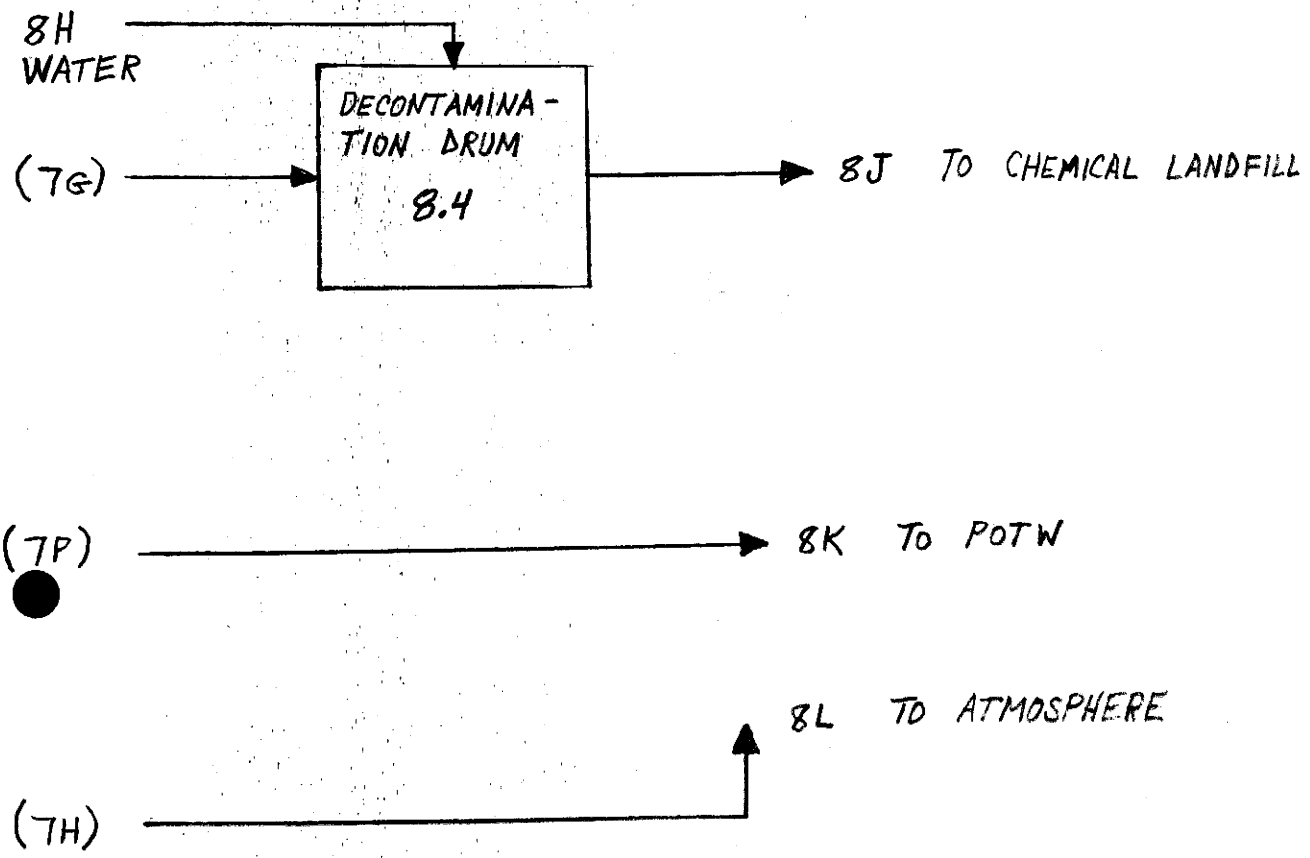
[X] Mark (X) this box if you attach a continuation sheet.

PART A RESIDUAL TREATMENT PROCESS DESCRIPTION

8.01 In accordance with the instructions, provide a residual treatment block flow diagram which describes the treatment process used for residuals identified in question 7.01.

CBI

[ ] Process type ..... CON'T.



[ ] Mark (X) this box if you attach a continuation sheet.

8.02 In accordance with the instructions, provide residual treatment block flow diagram(s which describe each of the treatment processes used for residuals identified in question 7.02.

CBI

[ ] Process type ..... N.A.

[ ] Mark (X) this box if you attach a continuation sheet.

8.03 In accordance with the instructions, provide residual treatment block flow diagram(s) which describe each of the treatment processes used for residuals identified in question 7.03.

CBI

[ ] Process type ..... REFER TO 8.01

[ ] Mark (X) this box if you attach a continuation sheet.

8.04 Describe the typical equipment types for each unit operation identified in your residual treatment block flow diagram(s). If a residual treatment block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Unit Operation ID Number (as assigned in questions 8.01, 8.02, or 8.03)	Typical Equipment Type
8.1	500 GALLON SETTLING TANK
8.2	5 GALLON STEEL PAIL
8.3	FIBERGLASS-PACKED MUFFLER
8.4	55 GALLON STEEL DRUM

[ ] Mark (X) this box if you attach a continuation sheet.

PART B RESIDUAL GENERATION AND CHARACTERIZATION

8.05 Characterize each process stream identified in your residual treatment block flow diagram(s). If a residual treatment block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the instructions for further explanation and an example.)

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

a. Stream ID Code	b. Type of Hazardous Waste[1]	c. Physical State of Residual[2]	d. Known Compounds[3]	e. Concentrations (% or ppm)[4,5,6]	f. Other Expected Compounds	g. Estimated Concentrations (% or ppm)
8A	NONE	AL	WATER	NA	NONE	
8B	NONE	AL	UREA	UK	UK	
			WATER	UK		
8C	NONE	SY	INSOLUBLE	UK	UK	
			UREAS			
8D	NONE	AL	WATER	NA	NONE	

8.05 continued below

[X] Mark (X) this box if you attach a continuation sheet.

PART B RESIDUAL GENERATION AND CHARACTERIZATION

8.05 Characterize each process stream identified in your residual treatment block flow diagram(s). If a residual treatment block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the instructions for further explanation and an example.)

CBI

[ ] Process type ..... CON'T.

a. Stream ID Code	b. Type of Hazardous Waste[1]	c. Physical State of Residual[2]	d. Known Compounds[3]	e. Concentrations (% or ppm)[4,5,6]	f. Other Expected Compounds	g. Estimated Concentrations (% or ppm)
8E	NONE	SO	INSOLUBLE	UK	UK	
			UREA			
8F	NONE	SY	INSOLUBLE	UK	UK	
			UREA			
8G	T	GU	2,4-TOLUENE DIISOCYANATE	0.012 ppm (A)(V)	NONE	
			2,6-TOLUENE DIISOCYANATE	0.005 ppm (A)(V)		
8H	NONE	AL	WATER	NA	NONE	

8.05 continued below

[X] Mark (X) this box if you attach a continuation sheet.

PART B RESIDUAL GENERATION AND CHARACTERIZATION

8.05 Characterize each process stream identified in your residual treatment block flow diagram(s). If a residual treatment block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the instructions for further explanation and an example.)

CBI

[ ] Process type .....

a. Stream ID Code	b. Type of Hazardous Waste[1]	c. Physical State of Residual[2]	d. Known Compounds[3]	e. Concentrations (% or ppm)[4,5,6]	f. Other Expected Compounds	g. Estimated Concentrations (% or ppm)
8J	NONE	SO	INSOLUBLE UREA	UK	UK	
8K	NONE	AL	NONE	NA	NONE	
8L	NONE	GU	AIR	UK	NONE	
			WATER VAPOR	UK		

8.05 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

8.05 (continued)

[1]Use the following codes to designate the type of hazardous waste:

I = Ignitable
C = Corrosive
R = Reactive
E = EP toxic
T = Toxic
H = Acutely hazardous

[2]Use the following codes to designate the physical state of the residual:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

8.05 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

8.05 (continued)

[3]For each additive package introduced into a process stream, specify the compounds that are present in each additive package, and the concentration of each component. Assign an additive package number to each additive package and list this number in column d. (Refer to the instructions for further explanation and an example. Refer to the glossary for the definition of additive package.)

Additive Package Number	Components of Additive Package	Concentrations (% or ppm)
1	NONE	
2		
3		
4		
5		

[4]Use the following codes to designate how the concentration was determined:

A = Analytical result
E = Engineering judgement/calculation

8.05 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

8.05 (continued)

[5]Use the following codes to designate how the concentration was measured:

V = Volume
W = Weight

[6]Specify the analytical test methods used and their detection limits in the table below. Assign a code to each test method used and list those codes in column e.

Code	Method	Detection Limit (± ug/l)
1		
2		
3		
4		
5		
6		

[ ] Mark (X) this box if you attach a continuation sheet.

8.06 Characterize each process stream identified in your residual treatment block flow diagram(s). If a residual treatment block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the instructions for further explanation and an example.)

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

a. Stream ID Code	b. Waste Description Code[1]	c. Management Method Code[2]	d. Residual Quantities (kg/yr)	e. Management of Residual (%) On-Site	e. Management of Residual (%) Off-Site	f. Costs for Off-Site Management (per kg)	g. Changes in Management Methods
8B	A05	M1	UK		100%	$0.06	NONE
8C	A05	M1	UK		100%	$0.06	NONE
8E	A11	1D	12.5		100%	UK	NONE
8F	A05	M1	UK		100%	$0.06	NONE

[1]Use the codes provided in Exhibit 8-1 to designate the waste descriptions

[2]Use the codes provided in Exhibit 8-2 to designate the management methods

[X] Mark (X) this box if you attach a continuation sheet.

8.06 Characterize each process stream identified in your residual treatment block flow diagram(s). If a residual treatment block flow diagram is provided for more than o process type, photocopy this question and complete it separately for each process type. (Refer to the instructions for further explanation and an example.)

CBI

[ ] Process type ..... NAFIL RESIN FP-6103 PREPOLYMER BATCH PROCESS

a. Stream ID Code	b. Waste Description Code[1]	c. Management Method Code[2]	d. Residual Quantities (kg/yr)	e. Management of Residual (%) On-Site	e. Management of Residual (%) Off-Site	f. Costs for Off-Site Management (per kg)	g. Changes Management Methods
8G	B91	M4b	UK	99.9%	0.1%	UK	NONE
8J	A11	1D	204		100%	UK	NONE

[1]Use the codes provided in Exhibit 8-1 to designate the waste descriptions

[2]Use the codes provided in Exhibit 8-2 to designate the management methods

[ ] Mark (X) this box if you attach a continuation sheet.

EXHIBIT 8-1
[REFERS TO QUESTION 8.06(b)]

WASTE DESCRIPTION CODES

These waste description codes were developed specifically for this survey to supplement the descriptions listed with the RCRA and other waste codes. (These waste description codes are not regulatory definitions.)

WASTE DESCRIPTION CODES FOR HAZARDOUS WASTE DESCRIBED BY A SINGLE RCRA F, K, P, OR U WASTE CODE

A01 Spent solvent (F001-F005, K086)
A02 Other organic liquid (F001-F005, K086)
A03 Still bottom (F001-F005, K086)
A04 Other organic sludge (F001-F005, K086)
A05 Wastewater or aqueous mixture
A06 Contaminated soil or cleanup residue
A07 Other F or K waste, exactly as described*
A08 Concentrated off-spec or discarded product
A09 Empty containers
A10 Incinerator ash
A11 Solidified treatment residue
A12 Other treatment residue (specify in "Facility Notes")
A13 Other untreated waste (specify in "Facility Notes")

*"Exactly as described" means that the waste matches the description of the RCRA waste code.

INORGANIC LIQUIDS—Waste that is primarily inorganic and highly fluid (e.g., aqueous), with low suspended inorganic solids and low organic content.

B01 Aqueous waste with low solvents
B02 Aqueous waste with low other toxic organics
B03 Spent acid with metals
B04 Spent acid without metals
B05 Acidic aqueous waste
B06 Caustic solution with metals but no cyanides
B07 Caustic solution with metals and cyanides
B08 Caustic solution with cyanides but no metals
B09 Spent caustic
B10 Caustic aqueous waste
B11 Aqueous waste with reactive sulfides
B12 Aqueous waste with other reactives (e.g., explosives)
B13 Other aqueous waste with high dissolved solids
B14 Other aqueous waste with low dissolved solids
B15 Scrubber water
B16 Leachate
B17 Waste liquid mercury
B18 Other inorganic liquid (specify in "Facility Notes")

INORGANIC SLUDGES—Waste that is primarily inorganic, with moderate-to-high water content and low organic content; pumpable.

B19 Lime sludge without metals
B20 Lime sludge with metals/metal hydroxide sludge
B21 Wastewater treatment sludge with toxic organics
B22 Other wastewater treatment sludge
B23 Untreated plating sludge without cyanides
B24 Untreated plating sludge with cyanides
B25 Other sludge with cyanides
B26 Sludge with reactive sulfides
B27 Sludge with other reactives
B28 Degreasing sludge with metal scale or filings
B29 Air pollution control device sludge (e.g., fly ash, wet scrubber sludge)
B30 Sediment or lagoon dragout contaminated with organics
B31 Sediment or lagoon dragout contaminated with inorganics only
B32 Drilling mud
B33 Asbestos slurry or sludge
B34 Chloride or other brine sludge
B35 Other inorganic sludge (specify in "Facility Notes")

INORGANIC SOLIDS—Waste that is primarily inorganic and solid, with low organic content and low-to-moderate water content; not pumpable.

B36 Soil contaminated with organics
B37 Soil contaminated with inorganics only
B38 Ash, slag, or other residue from incineration of wastes
B39 Other "dry" ash, slag, or thermal residue
B40 "Dry" lime or metal hydroxide solids chemically "fixed"
B41 "Dry" lime or metal hydroxide solids not "fixed"
B42 Metal scale, filings, or scrap
B43 Empty or crushed metal drums or containers
B44 Batteries or battery parts, casings, cores
B45 Spent solid filters or adsorbents
B46 Asbestos solids and debris
B47 Metal-cyanide salts/chemicals
B48 Reactive cyanide salts/chemicals
B49 Reactive sulfide salts/chemicals
B50 Other reactive salts/chemicals
B51 Other metal salts/chemicals
B52 Other waste inorganic chemicals
B53 Lab packs of old chemicals only
B54 Lab packs of debris only
B55 Mixed lab packs
B56 Other inorganic solids (specify in "Facility Notes")

INORGANIC GASES—Waste that is primarily inorganic with a low organic content and is a gas at atmospheric pressure.

B57 Inorganic gases

ORGANIC LIQUIDS—Waste that is primarily organic and is highly fluid, with low inorganic solids content and low-to-moderate water content.

B58 Concentrated solvent-water solution
B59 Halogenated (e.g., chlorinated) solvent
B60 Nonhalogenated solvent
B61 Halogenated/nonhalogenated solvent mixture
B62 Oil-water emulsion or mixture
B63 Waste oil
B64 Concentrated aqueous solution of other organics
B65 Concentrated phenolics
B66 Organic paint, ink, lacquer, or varnish
B67 Adhesives or expoxies
B68 Paint thinner or petroleum distillates
B69 Reactive or polymerizable organic liquid
B70 Other organic liquid (specify in "Facility Notes")

ORGANIC SLUDGES—Waste that is primarily organic, with low-to-moderate inorganic solids content and water content; pumpable.

B71 Still bottoms of halogenated (e.g., chlorinated) solvents or other organic liquids
B72 Still bottoms of nonhalogenated solvents or other organic liquids
B73 Oily sludge
B74 Organic paint or ink sludge
B75 Reactive or polymerizable organics
B76 Resins, tars, or tarry sludge
B77 Biological treatment sludge
B78 Sewage or other untreated biological sludge
B79 Other organic sludge (specify in "Facility Notes")

ORGANIC SOLIDS—Waste that is primarily organic and solid, with low-to-moderate inorganic content and water content; not pumpable.

B80 Halogenated pesticide solid
B81 Nonhalogenated pesticide solid
B82 Solid resins or polymerized organics
B83 Spent carbon
B84 Reactive organic solid
B85 Empty fiber or plastic containers
B86 Lab packs of old chemicals only
B87 Lab packs of debris only
B88 Mixed lab packs
B89 Other halogenated organic solid
B90 Other nonhalogenated organic solid

ORGANIC GASES—Waste that is primarily organic with low-to-moderate inorganic content and is a gas at atmospheric pressure.

B91 Organic gases

EXHIBIT 8-1.
(Refers to question 8.06(b))

WASTE DESCRIPTION CODES

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A05 Wastewater or aqueous mixture
A06 Contaminated soil or cleanup residue
A07 Other F or K waste, exactly as described*
A08 Concentrated off-spec or discarded product
A09 Empty containers
A10 Incinerator ash
A11 Solidified treatment residue
A12 Other treatment residue (specify in "Facility Notes")
A13 Other untreated waste (specify in "Facility Notes")

*"Exactly as described" means that the waste matches the description of the RCRA waste code.

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B01 Aqueous waste with low solvents
B02 Aqueous waste with low other toxic organics
B03 Spent acid with metals
B04 Spent acid without metals
B05 Acidic aqueous waste
B06 Caustic solution with metals but no cyanides
B07 Caustic solution with metals and cyanides
B08 Caustic solution with cyanides but no metals
B09 Spent caustic
B10 Caustic aqueous waste
B11 Aqueous waste with reactive sulfides
B12 Aqueous waste with other reactives (e.g., explosives)
B13 Other aqueous waste with high dissolved solids
B14 Other aqueous waste with low dissolved solids
B15 Scrubber water
B16 Leachate
B17 Waste liquid mercury
B18 Other inorganic liquid (specify in "Facility Notes")

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B19 Lime sludge without metals
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B21 Wastewater treatment sludge with toxic organics
B22 Other wastewater treatment sludge
B23 Untreated plating sludge without cyanides
B24 Untreated plating sludge with cyanides
B25 Other sludge with cyanides
B26 Sludge with reactive sulfides
B27 Sludge with other reactives
B28 Degreasing sludge with metal scale or filings
B29 Air pollution control device sludge (e.g., fly ash, wet scrubber sludge)
B30 Sediment or lagoon dragout contaminated with organics
B31 Sediment or lagoon dragout contaminated with inorganics only
B32 Drilling mud
B33 Asbestos slurry or sludge
B34 Chloride or other brine sludge
B35 Other inorganic sludge (specify in "Facility Notes")

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B36 Soil contaminated with organics
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B39 Other "dry" ash, slag, or thermal residue
B40 "Dry" lime or metal hydroxide solids chemically "fixed"
B41 "Dry" lime or metal hydroxide solids not "fixed"
B42 Metal scale, filings, or scrap
B43 Empty or crushed metal drums or containers
B44 Batteries or battery parts, casings, cores
B45 Spent solid filters or adsorbents
B46 Asbestos solids and debris
B47 Metal-cyanide salts/chemicals
B48 Reactive cyanide salts/chemicals
B49 Reactive sulfide salts/chemicals
B50 Other reactive salts/chemicals
B51 Other metal salts/chemicals
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B53 Lab packs of old chemicals only
B54 Lab packs of debris only
B55 Mixed lab packs
B56 Other inorganic solids (specify in "Facility Notes")

INORGANIC GASES—Waste that is primarily inorganic with a low organic content and is a gas at atmospheric pressure.

B57 Inorganic gases

ORGANIC LIQUIDS—Waste that is primarily organic and is highly fluid, with low inorganic solids content and low-to-moderate water content.

B58 Concentrated solvent-water solution
B59 Halogenated (e.g., chlorinated) solvent
B60 Nonhalogenated solvent
B61 Halogenated/nonhalogenated solvent mixture
B62 Oil-water emulsion or mixture
B63 Waste oil
B64 Concentrated aqueous solution of other organics
B65 Concentrated phenolics
B66 Organic paint, ink, lacquer, or varnish
B67 Adhesives or expoxies
B68 Paint thinner or petroleum distillates
B69 Reactive or polymerizable organic liquid
B70 Other organic liquid (specify in "Facility Notes")

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B71 Still bottoms of halogenated (e.g., chlorinated) solvents or other organic liquids
B72 Still bottoms of nonhalogenated solvents or other organic liquids
B73 Oily sludge
B74 Organic paint or ink sludge
B75 Reactive or polymerizable organics
B76 Resins, tars, or tarry sludge
B77 Biological treatment sludge
B78 Sewage or other untreated biological sludge
B79 Other organic sludge (specify in "Facility Notes")

ORGANIC SOLIDS—Waste that is primarily organic and solid, with low-to-moderate inorganic content and water content; not pumpable.

B80 Halogenated pesticide solid
B81 Nonhalogenated pesticide solid
B82 Solid resins or polymerized organics
B83 Spent carbon
B84 Reactive organic solid
B85 Empty fiber or plastic containers
B86 Lab packs of old chemicals only
B87 Lab packs of debris only
B88 Mixed lab packs
B89 Other halogenated organic solid
B90 Other nonhalogenated organic solid

ORGANIC GASES—Waste that is primarily organic with low-to-moderate inorganic content and is a gas at atmospheric pressure.

B91 Organic gases

EXHIBIT 8-2.
(Refers to question 8.06(c))

MANAGEMENT METHODS

M1 = Discharge to publicly owned wastewater treatment works
M2 = Discharge to surface water under NPDES
M3 = Discharge to off-site, privately owned wastewater treatment works
M4 = Scrubber: a) caustic; b) water; c) other
M5 = Vent to: a) atmosphere; b) flare; c) other (specify)_____
M6 = Other (specify)_____

TREATMENT AND RECYCLING

Incineration/thermal treatment
1I Liquid injection
2I Rotary or rocking kiln
3I Rotary kiln with a liquid injection unit
4I Two stage
5I Fixed hearth
6I Multiple hearth
7I Fluidized bed
8I Infrared
9I Fume/vapor
10I Pyrolytic destructor
11I Other incineration/thermal treatment

Reuse as fuel
1RF Cement kiln
2RF Aggregate kiln
3RF Asphalt kiln
4RF Other kiln
5RF Blast furnace
6RF Sulfur recovery furnace
7RF Smelting, melting, or refining furnace
8RF Coke oven
9RF Other industrial furnace
10RF Industrial boiler
11RF Utility boiler
12RF Process heater
13RF Other reuse as fuel unit

Fuel Blending
1FB Fuel blending

Solidification
1S Cement or cement/silicate processes
2S Pozzolanic processes
3S Asphaltic processes
4S Thermoplastic techniques
5S Organic polymer techniques
6S Jacketing (macro-encapsulation)
7S Other solidification

Recovery of solvents and liquid organics for reuse
1SR Fractionation
2SR Batch still distillation
3SR Solvent extraction
4SR Thin-film evaporation
5SR Filtration
6SR Phase separation
7SR Dessication
8SR Other solvent recovery

Recovery of metals
1MR Activated carbon (for metals recovery)
2MR Electrodialysis (for metals recovery)
3MR Electrolytic metal recovery
4MR Ion exchange (for metals recovery)
5MR Reverse osmosis (for metals recovery)
6MR Solvent extraction (for metals recovery)
7MR Ultrafiltration (for metals recovery)
8MR Other metals recovery

Wastewater Treatment
After each wastewater treatment type listed below (1WT - 66WT) specify a) tank; or b) surface impoundment (i.e., 63WTa)

Equalization
1WT Equalization

Cyanide oxidation
2WT Alkaline chlorination
3WT Ozone
4WT Electrochemical
5WT Other cyanide oxidation

General oxidation (including disinfection)
6WT Chlorination
7WT Ozonation
8WT UV radiation
9WT Other general oxidation

Chemical precipitation[1]
10WT Lime
11WT Sodium hydroxide
12WT Soda ash
13WT Sulfide
14WT Other chemical precipitation

Chromium reduction
15WT Sodium bisulfite
16WT Sulfur dioxide

EXHIBIT 8-2. (continued)

MANAGEMENT METHODS

17WT Ferrous sulfate
18WT Other chromium reduction

Complexed metals treatment (other than chemical precipitation by pH adjustment)
19WT Complexed metals treatment[1]

Emulsion breaking
20WT Thermal
21WT Chemical
22WT Other emulsion breaking

Adsorption
23WT Carbon adsorption
24WT Ion exchange
25WT Resin adsorption
26WT Other adsorption

Stripping
27WT Air stripping
28WT Steam stripping
29WT Other stripping

Evaporation
30WT Thermal
31WT Solar
32WT Vapor recompression
33WT Other evaporation

Filtration
34WT Diatomaceous earth
35WT Sand
36WT Multimedia
37WT Other filtration

Sludge dewatering
38WT Gravity thickening
39WT Vacuum filtration
40WT Pressure filtration (belt, plate and frame, or leaf)
41WT Centrifuge
42WT Other sludge dewatering

Air flotation
43WT Dissolved air flotation
44WT Partial aeration
45WT Air dispersion
46WT Other air flotation

Oil skimming
47WT Gravity separation
48WT Coalescing plate separation
49WT Other oil skimming

Other liquid phase separation
50WT Decanting
51WT Other liquid phase separation

Biological treatment
52WT Activated sludge
53WT Fixed film-trickling filter
54WT Fixed film-rotating contactor
55WT Lagoon or basin, aerated
56WT Lagoon, facultative
57WT Anaerobic
58WT Other biological treatment

Other wastewater treatment
59WT Wet air oxidation
60WT Neutralization
61WT Nitrification
62WT Denitrification
63WT Flocculation and/or coagulation
64WT Settling (clarification)
65WT Reverse osmosis
66WT Other wastewater treatment

OTHER WASTE TREATMENT

1TR Other treatment
2TR Other recovery for reuse

ACCUMULATION

1A Containers
2A Tanks

STORAGE

1ST Container (i.e., barrel, drum)
2ST Tank
3ST Waste pile
4ST Surface impoundment
5ST Other storage

DISPOSAL

1D Landfill
2D Land treatment
3D Surface impoundment (to be closed as a landfill)
4D Underground injection well

---

[1]Chemical precipitation is a treatment operation whereby the pH of a waste is adjusted to the range necessary for removal (precipitation) of contaminants. However, if the pH is adjusted solely to achieve a neutral pH, THE OPERATION SHOULD BE CONSIDERED NEUTRALIZATION (60WT).

PART C TRANSPORTATION OF RESIDUALS TO OFF-SITE FACILITIES

8.07 CBI [ ] Identify any special handling instructions for the residuals identified in your process block or residual treatment block flow diagram(s). (Refer to the instructions for an example.)

Stream ID Code	Special Handling Instructions
	NONE

8.08 CBI [ ] Identify those construction materials that are recommended (compatible) for containing or transporting the listed substance, and those materials that you know could cause a dangerous reaction or significant corrosion (incompatible) if they are used to contain or transport the listed substance.

Stream ID Code	Construction Materials	
	Compatible Containment Materials	Incompatible Containment Materials
		NONE

[ ] Mark (X) this box if you attach a continuation sheet.

8.09 Identify each off-site facility (including POTWs) that manages the residuals identified in your process block or residual treatment block flow diagram(s), and the quantity that each managed during the reporting year. Photocopy this question and complete it separately for each off-site facility.

CBI

[ ]

Stream ID Code	Annual Quantity (kg)
8B	NONE
8C	8,900,000 kg
8F	UK

Facility Name [A][L][C][O][S][A][N][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Address [P][O][ ][B][O][X][ ][2][6][0][8][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
Street

[P][I][T][T][S][B][U][R][G][H][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
City

[P][A] [1][5][1][0][6]--[ ][ ][ ][ ]
State Zip Code

EPA Identification Number (i.e.,
Hazardous Waste Facility ID Number) ..... [ ][ ][ ][ ][ ][ ][ ][ ][ ][U][K]

[ ] Mark (X) this box if you attach a continuation sheet.

8.09 Identify each off-site facility (including POTWs) that manages the residuals identified in your process block or residual treatment block flow diagram(s), and the quantity that each managed during the reporting year. Photocopy this question and complete it separately for each off-site facility.

CBI

[ ]

Stream ID Code	Annual Quantity (kg)
8E	12.5
8J	204

Facility Name [B][R][O][W][N][I][N][G][ ][F][E][R][R][I][S][ ][I][N][D][ ][ ][ ][ ]

Address [W][ ][N][O][B][L][E][S][T][O][W][N][ ][R][D][ ][ ][B][O][X][ ][0][0][1][ ]
Street

[P][I][T][T][S][B][U][R][G][H][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
City

[P][A] [1][5][1][0][6]--[ ][ ][ ][ ]
State Zip Code

EPA Identification Number (i.e., Hazardous Waste Facility ID Number) ..... [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][U][K]

[ ] Mark (X) this box if you attach a continuation sheet.

PART D ON-SITE RESIDUALS MANAGEMENT INFORMATION

8.10 Identification Permit Numbers -- List any applicable identification or permit numbers for your facility.

EPA National Pollutant Discharge Elimination System (NPDES) Permit No.(s) ..... NA
(discharges to surface water)

EPA Underground Injection Well (UIC) Permit No.(s) .....
(underground injection of fluids)

EPA Point Source Discharge (PSD) Permit No.(s) .....
(air emissions from point sources)

EPA Hazardous Waste Management Facility Permit No.(s) .....

Other EPA Permits (specify)

Allegheny County Bureau of Air Pollution Control Water Scrubber Permit 85-I-0055-P

[ ] Mark (X) this box if you attach a continuation sheet.

8.11 On-Site Storage or Treatment in Piles -- Complete this table for the five largest (by volume) piles that are used on-site to store or treat the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Pile	Quantity Managed per Year (cubic meters)	Under Roofed Structure (Y/N)	Type of Containment Provided[1]	Synthetic Liner Base (Y/N)[2]	Frequency of Transfer and/or Handling Operations[3]	Stream ID Code
1	NA					
2						
3						
4						
5						

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[1]Use the following codes to designate the type of containment provided:

C = Complete (includes both dike containment and underground (leachate) containment)
P1 = Partial-1 (includes just dike containment)
P2 = Partial-2 (includes just underground (leachate) containment)
N = None

[2]Waste may lie directly on the synthetic liner or the liner may be covered with a clay layer

[3]Use the following codes to designate frequency of transfer and/or handling operations:

A = Daily
B = Weekly
C = Monthly
D = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

8.12 On-Site Storage or Treatment in Tanks -- Complete the following table for the five largest (by volume) tanks that are used on-site to store or treat the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Tank	Design Capacity (liters)	Quantity per Year (liters)	Treatment Types[1]	Average Length of Storage (days)	Part of Wastewater Treatment Train (Y/N)[2]	Tank Covered (Y/N)	Type of Containment Provided[3]	Stream ID Code
1	NA							
2								
3								
4								
5								

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[1]Indicate "S" for storage or use the codes provided in Exhibit 8-3 (which follows question 8.13) to designate treatment types

[2]Treatment train from which wastewater is discharged under a NPDES permit or through a sewer system to a publicly owned treatment works

[3]Use the following codes to designate the type of containment provided:

C = Complete (includes both dike containment and underground (leachate) containment)
P1 = Partial-1 (includes just dike containment)
P2 = Partial-2 (includes just underground (leachate) containment)
N = None

[ ] Mark (X) this box if you attach a continuation sheet.

8.13 On-Site Storage, Treatment, or Disposal in Containers -- Complete the following table for the five largest (by volume) types of free standing containers that are used on-site to store, treat, or dispose of the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Container	Design Capacity (liters)	Quantity Stored per Year (liters)	Treatment Types[1]	Average Length of Storage (days)	Average Daily Stored Quantity (liters)	Maximum Operational Storage Capacity (liters)	Storage Base Material[2]	Stream ID Code
1	NA							
2								
3								
4								
5								

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]Indicate "S" for storage and use the codes provided in Exhibit 8-3 to designate treatment types

If residual is stored, indicate (Y/N) in parenthesis whether the storage area is designed and operated to collect and contain surface runoff

[2]Use the following codes to designate storage base materials:

A = Concrete
B = Asphalt
C = Soil
D = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

EXHIBIT 8-3
[REFERS TO QUESTIONS 8.12, 8.13, AND 8.29]

WASTEWATER TREATMENT TYPES

WASTEWATER TREATMENT

Equalization
1WT Equalization

Cyanide oxidation
2WT Alkaline chlorination
3WT Ozone
4WT Electrochemical
5WT Other cyanide oxidation

General oxidation (including disinfection)
6WT Chlorination
7WT Ozonation
8WT UV Radiation
9WT Other general oxidation

Chemical Precipitation[1]
10WT Lime
11WT Sodium hydroxide
12WT Soda ash
13WT Sulfide
14WT Other chemical precipitation

Chromium reduction
15WT Sodium bisulfite
16WT Sulfur dioxide
17WT Ferrous sulfate
18WT Other chromium reduction

Complexed metals treatment (other than chemical precipitation by pH adjustment)
19WT Complexed metals treatment

Emulsion breaking
20WT Thermal
21WT Chemical
22WT Other emulsion breaking

Adsorption
23WT Carbon adsorption
24WT Ion exchange
25WT Resin adsorption
26WT Other adsorption

Stripping
27WT Air stripping
28WT Steam stripping
29WT Other stripping

Evaporation
30WT Thermal
31WT Solar
32WT Vapor recompression
33WT Other evaporation

Filtration
34WT Diatomaceous earth
35WT Sand
36WT Multimedia
37WT Other filtration

Sludge dewatering
38WT Gravity thickening
39WT Vacuum filtration
40WT Pressure filtration (belt, plate and frame, or leaf)
41WT Centrifuge
42WT Other sludge dewatering

Air flotation
43WT Dissolved air flotation
44WT Partial aeration
45WT Air dispersion
46WT Other air flotation

Oil skimming
47WT Gravity separation
48WT Coalescing plate separation
49WT Other oil skimming

Other liquid phase separation
50WT Decanting
51WT Other liquid phase separation

Biological treatment
52WT Activated sludge
53WT Fixed film--trickling filter
54WT Fixed film--rotating contactor
55WT Lagoon or basin, aerated
56WT Lagoon, facultative
57WT Anaerobic
58WT Other biological treatment

Other wastewater treatment
59WT Wet air oxidation
60WT Neutralization
61WT Nitrification
62WT Denitrification
63WT Flocculation and/or coagulation
64WT Settling (clarification)
65WT Reverse osmosis
66WT Other wastewater treatment

---

[1]Chemical precipitation is a treatment operation whereby the pH of a waste is adjusted to the range necessary for removal (precipitation) of contaminants. However, if the pH is adjusted solely to achieve a neutral pH, THE OPERATION SHOULD BE CONSIDERED NEUTRALIZATION (60WT).

8.14 On-Site Burning in Boilers -- Complete the following table for the five largest (by capacity) boilers that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Boiler	Boiler Type[1]	Average Boiler Load[2] (%)	Average Fuel Replacement Ratio[3] (%)	Stream ID Code
1	NA			
2				
3				
4				
5				

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]Use the following codes to designate boiler type:

F = Fire tube
W = Water tube

[2]Designate the average boiler load when firing residual (percent of capacity)

[3]Designate the average fuel replacement ratio as a percentage (heat-input basis)

[ ] Mark (X) this box if you attach a continuation sheet.

8.15 Complete the following table for the five largest (by capacity) boilers that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Boiler	Boiler Heat Capacity (heat input in kJ/hr)	Primary Boiler Fuel[1]
1	NA	
2		
3		
4		
5		

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]Use the following codes to designate the primary boiler fuel:

A = Oil
B = Gas
C = Coal
D = Wood
E = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

8.16 Provide the following information for the residuals identified in your process block or residual treatment block flow diagram(s) that are burned in on-site boilers. Photocopy this question and complete it separately for each boiler.

CBI

[ ] Boiler number ..... NA

Stream ID code(s) .....

	Residual, as Fired (or residual mixture if residuals are blended)	Boiler Fuel, as Fired (residual(s) plus primary fuel)
Btu content (J/kg)		
Average		
Minimum		
Total halogen content (% by wt.)		
Average		
Maximum		

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[ ] Mark (X) this box if you attach a continuation sheet.

8.17 Complete the following table for the five largest (by capacity) boilers that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Boiler	Stream ID Code	Listed Metal[1]	Total Metal Content (% by weight) Avg.	Max.
1	NA			
2				
3				
4				
5				

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]A listed metal is either an EP toxic metal or a metal that is included on the California List (as defined in section 3004(d)(2) of the Resource Conservation and Recovery Act)

[ ] Mark (X) this box if you attach a continuation sheet.

8.18 Complete the following table for the five largest (by capacity) boilers that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Boiler	Air Pollution Control Device[1]	Types of Emissions Data Available
1	NA	
2		
3		
4		
5		

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]Use the following codes to designate the air pollution control device:

S = Scrubber (include type of scrubber in parenthesis)
E = Electrostatic precipitator
O = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

8.19 Stack Parameters -- Provide the following information for each of the five largest (by capacity) boilers that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s). Photocopy this question and complete it separately for each boiler.

CBI

[ ] Boiler number ..... NA

Stack height		m
Stack inner diameter (at outlet)		m
Exhaust temperature		°C
Vertical or horizontal stack		(V or H)
Annual emissions for the listed substance		kg/yr
Height of attached or adjacent building		m
Width of attached or adjacent building		m
Building cross-sectional area		m^2
Emission exit velocity		m/sec
Average emission rate of exit stream		kg/min
Maximum emission rate of exit stream		kg/min
Average duration of maximum emission rate of exit stream .		min
Frequency of maximum emission rate of exit stream		times/yea

Indicate if Office of Solid Waste survey has been submitted in lieu of respons by circling the appropriate response.

Yes 1

No 2

[ ] Mark (X) this box if you attach a continuation sheet.

8.20 On-Site Burning in Incinerators -- Complete the following table for the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Incinerator	Incinerator Type[1]	Primary Incinerator Fuel[2]	Average Fuel Replacement Ratio[3]	Stream ID Code
1	NA			
2				
3				

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]Use the following codes to designate the incinerator type:

1I = Liquid injection
2I = Rotary or rocking kiln
3I = Rotary kiln with a liquid injection unit
4I = Two stage
5I = Fixed hearth
6I = Multiple hearth
7I = Fluidized bed
8I = Infrared
9I = Fume/vapor
10I = Pyrolytic destructor
11I = Other (specify) _____

[2]Use the following codes to designate the primary incinerator fuel:

A = Oil
B = Gas
C = Coal
D = Wood
E = Other (specify) _____

[3]Designate the percentage of auxiliary fuel used when firing residual (percent of capacity)

[ ] Mark (X) this box if you attach a continuation sheet.

8.21 Complete the following table for the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Incinerator	Incinerator Heat Capacity (heat input in kJ/hr)	Feed Type[1]
1	NA	
2		
3		

Indicate if Office of Solid Waste survey has been submitted in lieu of respons by circling the appropriate response.

Yes .....

No .....

---

[1]Use the following codes to designate feed type:

A = Liquid nozzle type (specify) _____
B = Atomizing pressure (specify) _____
C = Solid-batch charge
D = Solid-continuous charge

[ ] Mark (X) this box if you attach a continuation sheet.

8.22 Describe the combustion chamber design parameters for each of the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Incinerator	Combustion Chamber Temperature (°C)		Location of Temperature Monitor		Residence Time In Combustion Chamber (seconds)	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
1	NA					
2						
3						

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

8.23 Complete the following table for the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Incinerator	Air Pollution Control Device[1]	Types of Emissions Data Available
1	NA	
2		
3		

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[1] Use the following codes to designate the air pollution control device:

S = Scrubber (include type of scrubber in parenthesis)
E = Electrostatic precipitator
O = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

8.24 Stack Parameters -- Provide the following information on stack parameters for the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI Photocopy this question and complete it separately for each incinerator.

[ ] Incinerator number ..... NA

Stack height ..... _____ m

Stack inner diameter (at outlet) ..... _____ m

Exhaust temperature ..... _____ °C

Vertical or horizontal stack ..... _____ (V or H)

Annual emissions for the listed substance ..... _____ kg/yr

Height of attached or adjacent building ..... _____ m

Width of attached or adjacent building ..... _____ m

Building cross-sectional area ..... _____ m^2

Emission exit velocity ..... _____ m/sec

Average emission rate of exit stream ..... _____ kg/min

Maximum emission rate of exit stream ..... _____ kg/min

Average duration of maximum emission rate of exit stream . _____ min

Frequency of maximum emission rate of exit stream ..... _____ times/year

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[ ] Mark (X) this box if you attach a continuation sheet.

8.25 Provide the following information on the incinerator feed for the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s). Photocopy this question and complete it separately for each incinerator.

CBI

[ ] Incinerator number ..... NA

Stream ID code(s) .....

	Residual, as Fired (or residual mixture if residuals are blended)	Incinerator Fuel, as Fired (residual(s) plus primary fuel)
Btu content (J/kg)		
Average		
Minimum		
Feed rate (kg/hr)		
Feed rate (J/hr)(kg/hr x J/kg)		
Total halogen content (% by weight)		
Average		
Maximum		
Total ash content (% by weight)		
Average		
Maximum		
Total water content (% by weight)		
Average		
Maximum		

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[ ] Mark (X) this box if you attach a continuation sheet.

8.26 Provide the following information on the incinerator feed for the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Incinerator	Stream ID Code	Listed Metal[1]	Total Metal Content (% by weight) Avg.	Max.
1	NA			
2				
3				

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[1]A listed metal is either an EP toxic metal or a metal that is included on the California List (as defined in section 3004(d)(2) of the Resource Conservation and Recovery Act)

[ ] Mark (X) this box if you attach a continuation sheet.

8.27 On-Site Storage, Treatment or Disposal in a Land Treatment Site -- Complete the following table for each on-site land treatment site that is used to store, treat, or dispose of the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ] Total area actively used for land treatment ..... NA m^2

Average slope of site (degree incline) .....

Surface water runoff management[1] .....

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]Use the following codes to describe the management practices for surface water runoff:

A = Collection prior to treatment
B = Reapplication to the site
C = Canalization prior to treatment
D = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

8.28 Complete the following table for the residuals identified in your process block or residual treatment block flow diagram(s) that are managed in an on-site land CBI treatment operation.

[ ]

Stream ID Code	Year Land Treatment Initiated	Methods Used to Apply Residuals[1]	Application Rate[2]
	NA		

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]Use the following codes to describe the method(s) used to apply residuals to the land treatment site:

A = Surface spreading or spray irrigation without plow or disc incorporation
B = Surface spreading or spray irrigation with plow or disc incorporation to a depth of _____cm
C = Subsurface injection to a depth of _____cm
D = Other (specify) _____

[2]Use the following codes to designate the application rate:

A = Daily
B = Weekly
C = Monthly
D = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

8.29 On-Site Storage, Treatment, or Disposal in Surface Impoundments -- Complete the following table for the five largest (by volume) surface impoundments that are used on-site to treat, store, or dispose of the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Impoundment	Total Capacity (liters)	Specify Storage, Disposal or Treatment Type if Applicable[1]	Average Residency Time (days)[2]	SYNTHETIC LINER No. of Liners	SYNTHETIC LINER Thickness (cm)[3]	CLAY LINER No. of Liners	CLAY LINER Thickness (cm)[3]	LEACHATE COLLECTION SYSTEM Installed (Y/N)	LEACHATE COLLECTION SYSTEM Leachate Collected (Y/N)	Stream ID Code
1	NA									
2										
3										
4										
5										

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[1]Indicate "S" for storage, "D" for disposal, or use the codes provided in Exhibit 8-3 (which follows question 8.13) to designate treatment type

[2]Indicate the residency time for the surface impoundment's flow through stream. In addition, indicate in parenthesis using the following codes the frequency with which the impoundment is dredged to clear the residue that collects on the bottom:

A = Daily
B = Weekly
C = Monthly
D = Other (specify) _____

[3]Indicate the thickness of each liner

[ ] Mark (X) this box if you attach a continuation sheet.

8.30 On-Site Disposal in Landfill Cells -- Complete the following table for the five largest (by volume) landfill cells that are used on-site to dispose of the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Landfill Cell	Quantity per year (kg)	DRAINAGE LAYER Installed (Y/N)	DRAINAGE LAYER Thickness (cm)	CLAY LINER No. of Liners	CLAY LINER Thickness (cm)[1]	SYNTHETIC LINER No. of Liners	SYNTHETIC LINER Material	SYNTHETIC LINER Thickness (cm)[1]	Stream ID Code
1	NA								
2									
3									
4									
5									

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[1]Indicate the thickness of each liner

[ ] Mark (X) this box if you attach a continuation sheet.

8.31 State the total area actively used on-site for your landfill.

CBI

[ ] Total area actively used ..... NA m^2

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

8.32 Complete the following table for the five largest landfill cells (by volume) that contain residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Landfill Cell	WORKING COVER: Average Use[1]	WORKING COVER: Thickness (cm)	CAP DESIGN CLAY LAYER: Installed (Y/N)	CAP DESIGN CLAY LAYER: Thickness (cm)	LEACHATE COLLECTION SYSTEM: Installed (Y/N)	LEACHATE COLLECTION SYSTEM: Leachate Collected (Y/N)
1	NA					
2						
3						
4						
5						

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

[1]Use the following codes to designate the average use rate:

A = Daily
B = Weekly
C = Monthly
D = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

8.33 On-Site Disposal in Injection Wells -- Complete the following table for the five largest (by volume) injection wells that are used on-site to dispose of the residuals identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Well	Well Type[1]	Quantity Disposed (liters)[2]	Stream ID Code
1	NA		
2			
3			
4			
5			

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1]Use the following codes to designate well type:

A = Wells that dispose below deepest groundwater with <10,000 mg/l of total dissolved solids
B = Wells that dispose into a formation containing groundwater with <10,000 mg/l of total dissolved solids
C = Wells that dispose above all groundwater
D = Other (specify) _____

[2]Indicate the quantity of listed substance disposed

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 9 WORKER EXPOSURE

General Instructions:

Questions 9.03-9.25 apply only to those processes and workers involved in manufacturing or processing the listed substance. Do not include workers involved in residual waste treatment unless they are involved in this treatment process on a regular basis (i.e., exclude maintenance workers, construction workers, etc.).

[ ] Mark (X) this box if you attach a continuation sheet.

PART A EMPLOYMENT AND POTENTIAL EXPOSURE PROFILE

9.01 Mark (X) the appropriate column to indicate whether your company maintains records or the following data elements for hourly and salaried workers. Specify for each data element the year in which you began maintaining records and the number of years the CBI records for that data element are maintained. (Refer to the instructions for further explanation and an example.)

[ ]

Data Element	Data are Maintained for: Hourly Workers	Salaried Workers	Year in Which Data Collection Began	Number of Years Records Are Maintained
Date of hire	X	X	1950	30
Age at hire	X	X	1950	30
Work history of individual before employment at your facility	NA	X	NA	30
Sex	X	X	1950	30
Race	X	X	1950	30
Job titles	X	X	1950	30
Start date for each job title	NA	NA	NA	NA
End date for each job title	NA	NA	NA	NA
Work area industrial hygiene monitoring data	NA	NA	NA	NA
Personal employee monitoring data	NA	NA	NA	NA
Employee medical history	X	X	1950	30
Employee smoking history	X	X	1950	30
Accident history	X	X	1950	30
Retirement date	X	X	1950	30
Termination date	X	X	1950	30
Vital status of retirees	NA	NA	NA	NA
Cause of death data	NA	NA	NA	NA

[ ] Mark (X) this box if you attach a continuation sheet.

9.02 In accordance with the instructions, complete the following table for each activity in which you engage.

CBI

[ ]

a. Activity	b. Process Category	c. Yearly Quantity (kg)	d. Total Workers	e. Total Worker-Hours
Manufacture of the listed substance	Enclosed	NONE		
	Controlled Release			
	Open			
On-site use as reactant	Enclosed			
	Controlled Release			
	Open	287,106	2	1438
On-site use as nonreactant	Enclosed	NONE		
	Controlled Release			
	Open			
On-site preparation of products	Enclosed			
	Controlled Release	748	2	1
	Open			

[ ] Mark (X) this box if you attach a continuation sheet.

9.03 Provide a descriptive job title for each labor category at your facility that encompasses workers who may potentially come in contact with or be exposed to the listed substance.

CBI

[ ]

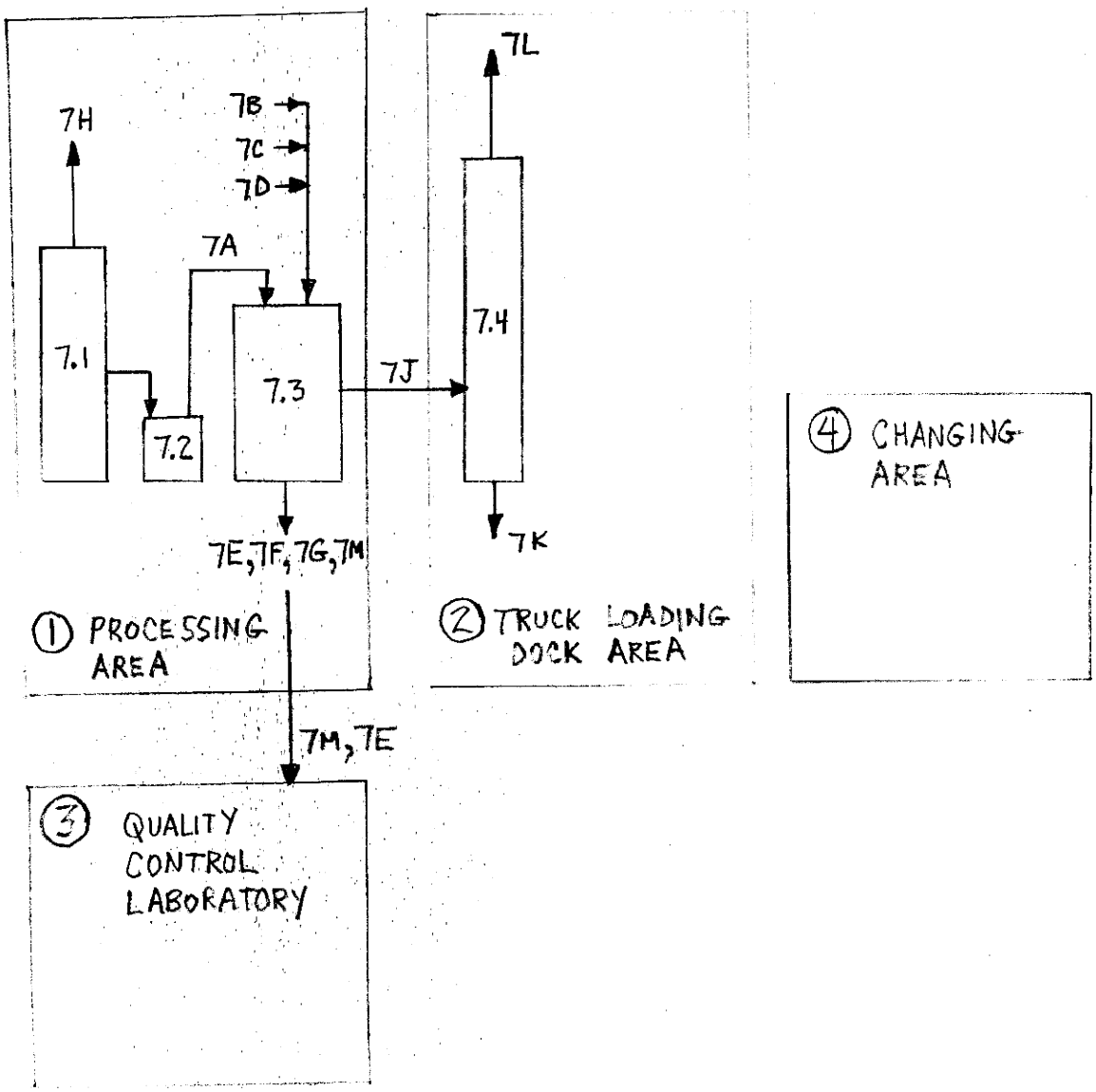
Labor Category	Descriptive Job Title
A	REACTOR OPERATOR(S)
B	FORKLIFT OPERATOR
C	LAB TECHNICIAN
D	MAINTENANCE MAN
E	
F	
G	
H	
I	
J	

[ ] Mark (X) this box if you attach a continuation sheet.

9.04 In accordance with the instructions, provide your process block flow diagram(s) and indicate associated work areas.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS



[ ] Mark (X) this box if you attach a continuation sheet.

9.05 Describe the various work area(s) shown in question 9.04 that encompass workers who may potentially come in contact with or be exposed to the listed substance. Add any additional areas not shown in the process block flow diagram in question 7.01 or 7.02. Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work Area ID	Description of Work Areas and Worker Activities
1	REACTOR AREA. WORKERS WEIGH AND CHARGE REACTANTS, MONITOR TEMPS, PREPARE FINISHED PRODUCT.
2	TRUCK DOCK - WORKERS LOAD FINISHED PRODUCT ONTO TRUCKS
3	QUALITY CONTROL LABORATORY - TECHNICIANS MONITOR QUALITY OF FINAL PRODUCT
4	CHANGING - OFFICE AREA - WORKERS CHANGE INTO AND OUT OF PROTECTIVE CLOTHES.
5	
6	
7	
8	
9	
10	

[ ] Mark (X) this box if you attach a continuation sheet.

9.06 Complete the following table for each work area identified in question 9.05, and for each labor category at your facility that encompasses workers who may potentially come in contact with or be exposed to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (1)

Labor Category	Number of Workers Exposed	Mode of Exposure (e.g., direct skin contact)	Physical State of Listed Substance[1]	Average Length of Exposure Per Day[2]	Number of Days per Year Exposed
A	1	DIRECT SKIN CONTACT INHALATION	OL, GU	E	208
D	1	INHALATION	OL, GU	B	10
B	1	INHALATION	OL, GU	B	30
A	1	DIRECT SKIN CONTACT INHALATION	OL, GU	E	12

[1] Use the following codes to designate the physical state of the listed substance at the point of exposure:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure; includes fumes, vapors, etc.)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

[2] Use the following codes to designate average length of exposure per day:

A = 15 minutes or less
B = Greater than 15 minutes, but not exceeding 1 hour
C = Greater than one hour, but not exceeding 2 hours
D = Greater than 2 hours, but not exceeding 4 hours
E = Greater than 4 hours, but not exceeding 8 hours
F = Greater than 8 hours

[X] Mark (X) this box if you attach a continuation sheet.

9.06 Complete the following table for each work area identified in question 9.05, and fo
each labor category at your facility that encompasses workers who may potentially
come in contact with or be exposed to the listed substance. Photocopy this questio
CBI and complete it separately for each process type and work area.

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (2)

Labor Category	Number of Workers Exposed	Mode of Exposure (e.g., direct skin contact)	Physical State of Listed Substance[1]	Average Length of Exposure Per Day[2]	Number of Days per Year Exposed
B	1	INHALATION	OL, GU	B	30
A	1	INHALATION	OL, GU	B	208
D	1	INHALATION	OL, GU	A	5
A	1	INHALATION	OL, GU	B	12

[1]Use the following codes to designate the physical state of the listed substance at the point of exposure:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure; includes fumes, vapors, etc.)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

[2]Use the following codes to designate average length of exposure per day:

A = 15 minutes or less
B = Greater than 15 minutes, but not exceeding 1 hour
C = Greater than one hour, but not exceeding 2 hours
D = Greater than 2 hours, but not exceeding 4 hours
E = Greater than 4 hours, but not exceeding 8 hours
F = Greater than 8 hours

[X] Mark (X) this box if you attach a continuation sheet.

9.06 Complete the following table for each work area identified in question 9.05, and for each labor category at your facility that encompasses workers who may potentially come in contact with or be exposed to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (3)

Labor Category	Number of Workers Exposed	Mode of Exposure (e.g., direct skin contact)	Physical State of Listed Substance[1]	Average Length of Exposure Per Day[2]	Number of Days per Year Exposed
C	2	DIRECT SKIN CONTACT / INHALATION	OL, GU	A	110

[1]Use the following codes to designate the physical state of the listed substance at the point of exposure:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure; includes fumes, vapors, etc.)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

[2]Use the following codes to designate average length of exposure per day:

A = 15 minutes or less
B = Greater than 15 minutes, but not exceeding 1 hour
C = Greater than one hour, but not exceeding 2 hours
D = Greater than 2 hours, but not exceeding 4 hours
E = Greater than 4 hours, but not exceeding 8 hours
F = Greater than 8 hours

[X] Mark (X) this box if you attach a continuation sheet.

9.06 Complete the following table for each work area identified in question 9.05, and fo
each labor category at your facility that encompasses workers who may potentially
come in contact with or be exposed to the listed substance. Photocopy this questio
CBI and complete it separately for each process type and work area.

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (4)

Labor Category	Number of Workers Exposed	Mode of Exposure (e.g., direct skin contact)	Physical State of Listed Substance[1]	Average Length of Exposure Per Day[2]	Number of Days per Year Exposed
A	1	INHALATION	GU	C	208
B	1	INHALATION	GU	C	30
D	1	INHALATION	GU	C	10
A	1	INHALATION	GU	C	12

[1]Use the following codes to designate the physical state of the listed substance at the point of exposure:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure; includes fumes, vapors, etc.)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

[2]Use the following codes to designate average length of exposure per day:

A = 15 minutes or less
B = Greater than 15 minutes, but not exceeding 1 hour
C = Greater than one hour, but not exceeding 2 hours
D = Greater than 2 hours, but not exceeding 4 hours
E = Greater than 4 hours, but not exceeding 8 hours
F = Greater than 8 hours

[ ] Mark (X) this box if you attach a continuation sheet.

9.07 For each labor category represented in question 9.06, indicate the 8-hour Time Weighted Average (TWA) exposure levels and the 15-minute peak exposure levels. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (1)

Labor Category	8-hour TWA Exposure Level (ppm, mg/m^3, other-specify)	15-Minute Peak Exposure Level (ppm, mg/m^3, other-specify)
A	20 ppm	100 ppm
B	20 ppm	100 ppm
D	20 ppm	100 ppm

[X] Mark (X) this box if you attach a continuation sheet.

9.07 For each labor category represented in question 9.06, indicate the 8-hour Time Weighted Average (TWA) exposure levels and the 15-minute peak exposure levels. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (2)

Labor Category	8-hour TWA Exposure Level (ppm, mg/m^3, other-specify)	15-Minute Peak Exposure Level (ppm, mg/m^3, other-specify)
A	UK	20 ppm
B	UK	20 ppm
D	UK	20 ppm

[X] Mark (X) this box if you attach a continuation sheet.

9.07 For each labor category represented in question 9.06, indicate the 8-hour Time Weighted Average (TWA) exposure levels and the 15-minute peak exposure levels. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (3)

Labor Category	8-hour TWA Exposure Level (ppm, mg/m^3, other-specify)	15-Minute Peak Exposure Level (ppm, mg/m^3, other-specify)
C	UK	UK

[X] Mark (X) this box if you attach a continuation sheet.

9.07 For each labor category represented in question 9.06, indicate the 8-hour Time Weighted Average (TWA) exposure levels and the 15-minute peak exposure levels. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (4)

Labor Category	8-hour TWA Exposure Level (ppm, mg/m^3, other-specify)	15-Minute Peak Exposure Level (ppm, mg/m^3, other-specify)
A	UK	UK
B	UK	UK
D	UK	UK

[ ] Mark (X) this box if you attach a continuation sheet.

PART B WORK PLACE MONITORING PROGRAM

9.08 If you monitor worker exposure to the listed substance, complete the following table.

CBI

[ ]

Sample/Test	Work Area ID	Testing Frequency (per year)	Number of Samples (per test)	Who Samples[1]	Analyzed In-House (Y/N)	Number of Years Records Maintained
Personal breathing zone	NA					
General work area (air)	(1)	1	2	D	N	NA
Wipe samples	NA					
Adhesive patches	NA					
Blood samples	NA					
Urine samples	NA					
Respiratory samples	NA					
Allergy tests	NA					
Other (specify) STACK TESTS	(2)	1	3	D	N	NA
Other (specify)						
Other (specify)						

[1]Use the following codes to designate who takes the monitoring samples:

A = Plant industrial hygienist
B = Insurance carrier
C = OSHA consultant
D = Other (specify) HEMEON ASSOCIATES, INC
AIR POLUTION CONSULTING ENGINEERS
125 39TH ST.
PITTSBURGH PA 15201

[ ] Mark (X) this box if you attach a continuation sheet.

9.09 For each sample type identified in question 9.08, describe the type of sampling and analytical methodology used for each type of sample.

CBI

[ ]	Sample Type	Sampling and Analytical Methodology
	PROCESS AREA (1)	COATED FIBERGLASS FILTER TUBE/PUMP WITH OSHA METHOD 42-HPLC ANALYSIS.
	SCRUBBER STACK OUTLET (2)	FEDERAL REGISTER, PART 60, METHOD 5, (JULY 1, 1986) WITH OSHA METHOD 42 - HPLC ANALYSIS.

9.10 If you conduct personal and/or ambient air monitoring for the listed substance, specify the following information for each equipment type used.

CBI

[ ]	Equipment Type[1]	Detection Limit[2]	Manufacturer	Averaging Time (hr)	Model Number
	NA				

[1]Use the following codes to designate personal air monitoring equipment types:

A = Passive dosimeter
B = Detector tube
C = Charcoal filtration tube with pump
D = Other (specify) _____

Use the following codes to designate ambient air monitoring equipment types:

E = Stationary monitors located within work area
F = Stationary monitors located within facility
G = Stationary monitors located at plant boundary
H = Mobile monitoring equipment (specify) _____
I = Other (specify) _____

[2]Use the following codes to designate detection limit units:

A = ppm
B = Fibers/cubic centimeter (f/cc)
C = Micrograms/cubic meter (μ/m^3)

[ ] Mark (X) this box if you attach a continuation sheet.

9.11 If you conduct routine medical tests for monitoring the health effects of exposure to the listed substance, specify the type and frequency of the tests.

CBI

[ ]	Test Description	Frequency (weekly, monthly, yearly, etc.)
	NONE	

[ ] Mark (X) this box if you attach a continuation sheet.

PART C ENGINEERING CONTROLS

9.12 Describe the engineering controls that you use to reduce or eliminate worker exposure to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (1)

Engineering Controls	Used (Y/N)	Year Installed	Upgraded (Y/N)	Year Upgraded
Ventilation:				
Local exhaust	Y	1984	Y	1987
General dilution	N			
Other (specify)				
Vessel emission controls	Y	1987	N	
Mechanical loading or packaging equipment	N			
Other (specify)				

[X] Mark (X) this box if you attach a continuation sheet.

PART C ENGINEERING CONTROLS

9.12 Describe the engineering controls that you use to reduce or eliminate worker exposure to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCES.

Work area ..... (2)

Engineering Controls	Used (Y/N)	Year Installed	Upgraded (Y/N)	Year Upgraded
Ventilation:				
Local exhaust	NONE			
General dilution	N			
Other (specify)				
Vessel emission controls	Y			
Mechanical loading or packaging equipment	N			
Other (specify)				

[X] Mark (X) this box if you attach a continuation sheet.

PART C ENGINEERING CONTROLS

9.12 Describe the engineering controls that you use to reduce or eliminate worker exposur to the listed substance. Photocopy this question and complete it separately for eac process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCES.

Work area ..... (3)

Engineering Controls	Used (Y/N)	Year Installed	Upgraded (Y/N)	Year Upgraded
Ventilation:				
Local exhaust	N			
General dilution	N			
Other (specify)				
FUME HOOD	Y	NA	N	
Vessel emission controls	N			
Mechanical loading or packaging equipment	N			
Other (specify)				
	N			

[X] Mark (X) this box if you attach a continuation sheet.

PART C ENGINEERING CONTROLS

9.12 Describe the engineering controls that you use to reduce or eliminate worker exposur to the listed substance. Photocopy this question and complete it separately for eac process type and work area.

CBI

[__] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCES.

Work area ..... (4)

Engineering Controls	Used (Y/N)	Year Installed	Upgraded (Y/N)	Year Upgraded
Ventilation:				
Local exhaust	NONE			
General dilution				
Other (specify)				
Vessel emission controls				
Mechanical loading or packaging equipment				
Other (specify)				

[__] Mark (X) this box if you attach a continuation sheet.

9.13 Describe all equipment or process modifications you have made within the 3 years prior to the reporting year that have resulted in a reduction of worker exposure to the listed substance. For each equipment or process modification described, state the percentage reduction in exposure that resulted. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (1)

Equipment or Process Modification	Reduction in Worker Exposure Per Year (%)
INSTALLATION OF FUME SCRUBBER (1987)	UK

[ ] Mark (X) this box if you attach a continuation sheet.

PART D PERSONAL PROTECTIVE AND SAFETY EQUIPMENT

9.14 Describe the personal protective and safety equipment that your workers wear or use in each work area in order to reduce or eliminate their exposure to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (1)

Equipment Types	Wear or Use (Y/N)
Respirators	Y
Safety goggles/glasses	Y
Face shields	N
Coveralls	Y
Bib aprons	Y
Chemical-resistant gloves	Y
Other (specify)	
AIR-SUPPLIED RESPIRATOR	Y

[X] Mark (X) this box if you attach a continuation sheet.

PART D PERSONAL PROTECTIVE AND SAFETY EQUIPMENT

9.14 Describe the personal protective and safety equipment that your workers wear or use in each work area in order to reduce or eliminate their exposure to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (2)

Equipment Types	Wear or Use (Y/N)
Respirators	Y
Safety goggles/glasses	N
Face shields	N
Coveralls	N
Bib aprons	N
Chemical-resistant gloves	Y
Other (specify)	
_____	_____
_____	_____

[X] Mark (X) this box if you attach a continuation sheet.

PART D PERSONAL PROTECTIVE AND SAFETY EQUIPMENT

9.14 Describe the personal protective and safety equipment that your workers wear or use in each work area in order to reduce or eliminate their exposure to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (3)

Equipment Types	Wear or Use (Y/N)
Respirators	Y
Safety goggles/glasses	Y
Face shields	N
Coveralls	N
Bib aprons	N
Chemical-resistant gloves	Y
Other (specify)	
FUME HOOD	Y

[ ] Mark (X) this box if you attach a continuation sheet.

9.15 If workers use respirators when working with the listed substance, specify for each process type, the work areas where the respirators are used, the type of respirators used, the average usage, whether or not the respirators were fit tested, and the type and frequency of the fit tests. Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work Area	Respirator Type	Average Usage[1]	Fit Tested (Y/N)	Type of Fit Test[2]	Frequency of Fit Tests (per year)
1	AIR-SUPPLIED MASK	A	N		
2	ORGANIC CANISTER	E	N		
3	ORGANIC CANISTER	B	N		

[1]Use the following codes to designate average usage:

A = Daily
B = Weekly
C = Monthly
D = Once a year
E = Other (specify) WHEN NEEDED

[2]Use the following codes to designate the type of fit test:

QL = Qualitative
QT = Quantitative

[ ] Mark (X) this box if you attach a continuation sheet.

9.16 Respirator Maintenance Program -- For each type of respirator used when working with the listed substance, specify the frequency of the maintenance activity, and the person who performs the maintenance activity. Photocopy this question and complete it separately for each respirator type.

Respirator type ..... MINE SAFETY APPLIANCE, INC. #475217 PRESSURE-DEMAND FULL-FACE AIR-SUPPLIED

Respirator Maintenance Activity	Frequency[1]	Person Performing Activity[2]
Cleaning	A	D
Inspection	A	D
Replacement		
Cartridge/Canister		
Respirator unit	C	B

[1]Use the following codes to designate the frequency of maintenance activity:

A = After each use
B = Weekly
C = Other (specify) WHEN NEEDED

[2]Use the following codes to designate who performs the maintenance activity:

A = Plant industrial hygienist
B = Supervisor
C = Foreman
D = Other (specify) REACTOR OPERATOR

[X] Mark (X) this box if you attach a continuation sheet.

9.16 Respirator Maintenance Program -- For each type of respirator used when working with the listed substance, specify the frequency of the maintenance activity, and the person who performs the maintenance activity. Photocopy this question and complete it separately for each respirator type.

Respirator type ..... MINE SAFETY APPLIANCE, INC. #448849 ORGANIC CARTRIDGE HALF-FACE RESPIRATORS

Respirator Maintenance Activity	Frequency[1]	Person Performing Activity[2]
Cleaning	B	D
Inspection	B	D
Replacement		
Cartridge/Canister	B	D
Respirator unit	C	B

[1]Use the following codes to designate the frequency of maintenance activity:

A = After each use
B = Weekly
C = Other (specify) WHEN NEEDED

[2]Use the following codes to designate who performs the maintenance activity:

A = Plant industrial hygienist
B = Supervisor
C = Foreman
D = Other (specify) LAB TECHNICIAN

[ ] Mark (X) this box if you attach a continuation sheet.

9.17 Respirator Training Program -- Describe your respirator training and re-training programs for each type of respirator used when working with the listed substance. Photocopy this question and complete it separately for each respirator type.

a.

Respirator type ..... #475217 FULL-FACE AIR-SUPPLIED

Type of Training[1]	Number of Workers Trained	Location of Training[2]	Length of Training (hrs)	Person Performing Training[3]	Frequency[4]
R	1	C	UK	D	C

b.

Respirator type .....

Type of Re-training[1]	Number of Workers Re-trained	Location of Re-Training[2]	Length of Re-Training (hrs)	Person Performing Re-Training[3]	Frequency[4]
NONE					

[1]Use the following codes to designate the type of training or re-training:

E = Emergency
R = Routine

[2]Use the following codes to designate the location of training or re-training:

A = Outside plant instruction
B = In-house classroom instruction
C = On-the-job
D = Other (specify) _____

[3]Use the following codes to designate the person who performs the training or re-training:

A = Plant industrial hygienist
B = Supervisor
C = Foreman
D = Other (specify) MANUFACTURER'S REP

[4]Use the following codes to designate the frequency of respirator training or re-training:

A = Monthly
B = Fixed monthly
C = Other (specify) WHEN NEW EQUIPMENT PUT IN SERVICE

[ ] Mark (X) this box if you attach a continuation sheet.

9.18 For each type of personal protective clothing and safety equipment used when working with the listed substance, indicate whether you have conducted a permeation test on the clothing or equipment for the listed substance.

Clothing and Equipment	Permeation Tests Conducted (Y/N)
Coveralls	N
Bib apron	N
Gloves	N
Other (specify)	

[ ] Mark (X) this box if you attach a continuation sheet.

PART E WORK PRACTICES

9.19 Describe all of the work practices and administrative controls used to reduce or eliminate worker exposure to the listed substance (e.g., restrict entrance only to authorized workers, mark areas with warning signs, insure worker detection and monitoring practices, provide worker training programs, etc.). Photocopy this CBI question and complete it separately for each process type and work area.

[ ]

Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... ① & ②

RESTRICTED ENTRY. BUILDING WARNING PLACARDS.
EDUCATE ALL PLANT EMPLOYEES AS TO HAZARD PRESENT.
ONGOING EDUCATION PROGRAM FOR REACTOR OPERATORS
AS TO SAFETY & HEALTH CONCERNS.

9.20 Indicate (X) how often you perform each housekeeping task used to clean up routine leaks or spills of the listed substance. Photocopy this question and complete it separately for each process type and work area.

Process type ..... NAFIL RESIN FP-6403

Work area ..... ① & ②

Housekeeping Tasks	Less Than Once Per Day	1-2 Times Per Day	3-4 Times Per Day	More Than 4 Times Per Day
Sweeping	X			
Vacuuming	NONE			
Water flushing of floors	NONE			
Other (specify)				
WATER DECONTAMINATION OF CLEANUR RAGS, ETC.	DAILY			

[X] Mark (X) this box if you attach a continuation sheet.

PART E WORK PRACTICES

9.19 Describe all of the work practices and administrative controls used to reduce or eliminate worker exposure to the listed substance (e.g., restrict entrance only to authorized workers, mark areas with warning signs, insure worker detection and monitoring practices, provide worker training programs, etc.). Photocopy this CBI question and complete it separately for each process type and work area.

[ ]

Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Work area ..... (3) & (4)

GOOD HOUSEKEEPING. TRAINING PROGRAMS.
LAUNDERING SERVICES FOR WORKCLOTHES.

9.20 Indicate (X) how often you perform each housekeeping task used to clean up routine leaks or spills of the listed substance. Photocopy this question and complete it separately for each process type and work area.

Process type ..... QUALITY CONTROL LABORATORY

Work area ..... (3)

Housekeeping Tasks	Less Than Once Per Day	1-2 Times Per Day	3-4 Times Per Day	More Than 4 Times Per Day
Sweeping	NA			
Vacuuming	NA			
Water flushing of floors	NA			
Other (specify)				
FUME HOOD	X			

[ ] Mark (X) this box if you attach a continuation sheet.

9.21 Do you have a written medical action plan for responding to routine or emergency exposure to the listed substance?

Routine exposure

Yes .....

No .....

Emergency exposure

Yes .....

No .....

If yes, where are copies of the plan maintained?

Routine exposure: _____

Emergency exposure: _____

9.22 Do you have a written leak and spill cleanup plan that addresses the listed substance? Circle the appropriate response.

Yes .....

No .....

If yes, where are copies of the plan maintained? LABORATORY

Has this plan been coordinated with state or local government response organizations? Circle the appropriate response.

Yes .....

No .....

9.23 Who is responsible for monitoring worker safety at your facility? Circle the appropriate response.

Plant safety specialist .....

Insurance carrier .....

OSHA consultant .....

Other (specify) OWNERS .....

[ ] Mark (X) this box if you attach a continuation sheet.

9.24 Who is responsible for safety and health training at your facility? Circle the appropriate response.

Plant safety specialist 1

Insurance carrier 2

OSHA consultant 3

Other (specify) OWNERS 4

9.25 Who is responsible for the medical program at your facility? Circle the appropriate response.

Plant physician 1

Consulting physician 2

Plant nurse 3

Consulting nurse 4

Other (specify) NONE 5

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 10 ENVIRONMENTAL RELEASE

General Instructions:

Complete Part E (questions 10.23-10.35) for each non-routine release involving the listed substance that occurred during the reporting year. Report on all releases that are equal to or greater than the listed substance's reportable quantity value, RQ, unless the release is federally permitted as defined in 42 U.S.C. 9601, or is specifically excluded under the definition of release as defined in 40 CFR 302.3(22). Reportable quantities are codified in 40 CFR Part 302. If the listed substance is not a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and, thus, does not have an RQ, then report releases that exceed 2,270 kg. If such a substance however, is designated as a CERCLA hazardous substance, then report those releases that are equal to or greater than the RQ. The facility may have answered these questions or similar questions under the Agency's Accidental Release Information Program and may already have this information readily available. Assign a number to each release and use this number throughout this part to identify the release. Releases over more than a 24-hour period are not single releases, i.e., the release of a chemical substance equal to or greater than an RQ must be reported as a separate release for each 24-hour period the release exceeds the RQ.

For questions 10.25-10.35, answer the questions for each release identified in question 10.23. Photocopy these questions and complete them separately for each release.

PART A GENERAL INFORMATION

10.01 Where is your facility located? Circle all appropriate responses.

CBI

[ ] Industrial area ..... (1)

Urban area 2

Residential area ..... (3)

Agricultural area 4

Rural area 5

Adjacent to a park or a recreational area 6

Within 1 mile of a navigable waterway ..... (7)

Within 1 mile of a school, university, hospital, or nursing home facility ..... (8)

Within 1 mile of a non-navigable waterway ..... (9)

Other (specify) _____ 10

[ ] Mark (X) this box if you attach a continuation sheet.

10.02 Specify the exact location of your facility (from central point where process unit is located) in terms of latitude and longitude or Universal Transverse Mercader (UTM) coordinates.

Latitude ..... N 40 ° 27 ' 46 "

Longitude ..... W 80 ° 3 ' 10 "

UTM coordinates ..... Zone _____, Northing _____, Easting _____

10.03 If you monitor meteorological conditions in the vicinity of your facility, provide the following information.

Average annual precipitation ..... UK inches/year

Predominant wind direction ..... UK

10.04 Indicate the depth to groundwater below your facility.

Depth to groundwater ..... UK meters

10.05 For each on-site activity listed, indicate (Y/N/NA) all routine releases of the listed substance to the environment. (Refer to the instructions for a definition of Y, N, and NA.)

CBI

[ ]

On-Site Activity	Environmental Release		
	Air	Water	Land
Manufacturing	NA	NA	NA
Importing	NA	NA	NA
Processing	Y	N	N
Otherwise used	NA	NA	NA
Product or residual storage	N	N	N
Disposal	NA	NA	NA
Transport	N	N	N

[ ] Mark (X) this box if you attach a continuation sheet.

10.06 Provide the following information for the listed substance and specify the level of precision for each item. (Refer to the instructions for further explanation and an example.)

CBI

[ ]

Quantity discharged to the air	3	kg/yr ±	100 %
Quantity discharged in wastewaters	NONE	kg/yr ±	___ %
Quantity managed as other waste in on-site treatment, storage, or disposal units	216	kg/yr ±	10 %
Quantity managed as other waste in off-site treatment, storage, or disposal units	NONE	kg/yr ±	___ %

[ ] Mark (X) this box if you attach a continuation sheet.

10.07 Complete the following table for each process stream containing the listed substance as identified in your process block or residual treatment block flow diagram(s). Photocopy this question and complete it separately for each process type.

CBI

[ ]

Process type ..... NAFIL RESIN FP-6403 PREPOLYMER BATCH PROCESS

Process Stream ID Code	Media Affected[1]	Average Amount of Listed Substance Released[2]	Number of Batches/Year	Days of Operation/ Year
7L	A	.03 Kg/BATCH	100-110	220
7J	NONE			
7B	NONE			

[1]Use the following codes to designate the media affected:

A = Air
B = Land
C = Groundwater
D = POTW
E = Navigable waterway
F = Non-navigable waterway
G = Other (specify) _____

[2]Specify the average amount of listed substance released to the environment and use the following codes to designate the units used to measure the release:

A = kg/day
B = kg/batch

[X] Mark (X) this box if you attach a continuation sheet.

10.07 Complete the following table for each process stream containing the listed substance as identified in your process block or residual treatment block flow diagram(s). Photocopy this question and complete it separately for each process type.

CBI

[ ]

Process type ..... NAFIL RESIN FP-6403

Process Stream ID Code	Media Affected[1]	Average Amount of Listed Substance Released[2]	Number of Batches/Year	Days of Operation/ Year
7F	B	NONE		
7G	B	NONE		
7E, 7M	NONE	NONE		

[1] Use the following codes to designate the media affected:

A = Air
B = Land
C = Groundwater
D = POTW
E = Navigable waterway
F = Non-navigable waterway
G = Other (specify) _____

[2] Specify the average amount of listed substance released to the environment and use the following codes to designate the units used to measure the release:

A = kg/day
B = kg/batch

[ ] Mark (X) this box if you attach a continuation sheet.

10.08 Describe the control technologies used to minimize release of the listed substance for each process stream containing the listed substance as identified in your process block or residual treatment block flow diagram(s). Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403

Stream ID Code	Control Technology	Percent Efficiency
7L	NONE	
7J	FLOATING BED WATER SCRUBBER	99.9 %
7B	NONE	
7F	WATER DECONTAMINATION	100 %
7G	WATER DECONTAMINATION	100 %
7E, 7M	NONE	

[ ] Mark (X) this box if you attach a continuation sheet.

PART B RELEASE TO AIR

10.09 Point Source Emissions -- Identify each emission point source containing the listed substance in terms of a Stream ID Code as identified in your process block or residual treatment block flow diagram(s), and provide a description of each point source. Do not include raw material and product storage vents, or fugitive emissio sources (e.g., equipment leaks). Photocopy this question and complete it separatel for each process type.

CBI

[ ]

Process type ..... NAFIL RESIN FP-6403

Point Source ID Code	Description of Emission Point Source
7L	WATER SCRUBBER STACK

[ ] Mark (X) this box if you attach a continuation sheet.

[ ] Mark (X) this box if you attach a continuation sheet.

10.10 Emission Characteristics - - Characterize the emissions for each Point Source ID Code identified in question 10.09 by completing the following table.

CBI

[ ]

Point Source ID Code	Physical State[1]	Average Emissions (kg/day)	Frequency[2] (days/yr)	Duration[3] (min/day)	Average Emission Factor[4]	Maximum Emission Rate (kg/min)	Maximum Emission Rate Frequency (events/yr)	Maximum Emission Rate Duration (min/event)
7L	V	.015	220	390	5×10^{-6}	3.8×10^{-5}	220	390

[1]Use the following codes to designate physical state at the point of release:
G = Gas; V = Vapor; P = Particulate; A = Aerosol; O = Other (specify) _____

[2]Frequency of emission at any level of emission

[3]Duration of emission at any level of emission

[4]Average Emission Factor — Provide estimated (± 25 percent) emission factor (kg of emission per kg of production of listed substance)

10.11 Stack Parameters -- Identify the stack parameters for each Point Source ID Code identified in question 10.09 by completing the following table.

CBI

[ ]

Point Source ID Code	Stack Height(m)	Stack Inner Diameter (at outlet) (m)	Exhaust Temperature (°C)	Emission Exit Velocity (m/sec)	Building Height(m)[1]	Building Width(m)[2]	Vent Type[3]
7L	9.8	0.41	43°C	9	6.1	30	V

[1]Height of attached or adjacent building

[2]Width of attached or adjacent building

[3]Use the following codes to designate vent type:

H = Horizontal
V = Vertical

[ ] Mark (X) this box if you attach a continuation sheet.

10.12 If the listed substance is emitted in particulate form, indicate the particle size distribution for each Point Source ID Code identified in question 10.09. Photocopy this question and complete it separately for each emission point source.

CBI

[ ]

Point source ID code ..... NA

Size Range (microns)	Mass Fraction (% ± % precision)
< 1	
≥ 1 to < 10	
≥ 10 to < 30	
≥ 30 to < 50	
≥ 50 to < 100	
≥ 100 to < 500	
≥ 500	

Total = 100%

[ ] Mark (X) this box if you attach a continuation sheet.

10.13 Equipment Leaks -- Complete the following table by providing the number of equipment types listed which are exposed to the listed substance and which are in service according to the specified weight percent of the listed substance passing through the component. Do this for each process type identified in your process block or residual treatment block flow diagram(s). Do not include equipment types that are not exposed to the listed substance. If this is a batch or intermittently operated process, give an overall percentage of time per year that the process type is exposed to the listed substance. Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... NAFIL RESIN FP-6403

Percentage of time per year that the listed substance is exposed to this process type ..... 16 %

Equipment Type	Number of Components in Service by Weight Percent of Listed Substance in Process Stream					
	Less than 5%	5-10%	11-25%	26-75%	76-99%	Greater than 99%
Pump seals[1]						
Packed	NA					
Mechanical	2					
Double mechanical[2]	NA					
Compressor seals[1]	NA					
Flanges	12					
Valves						
Gas[3]	NA					
Liquid	1					
Pressure relief devices[4] (Gas or vapor only)	NA					
Sample connections						
Gas	NA					
Liquid	NA					
Open-ended lines[5] (e.g., purge, vent)						
Gas	NA					
Liquid	2					

[1] List the number of pump and compressor seals, rather than the number of pumps or compressors

10.13 continued on next page

[ ] Mark (X) this box if you attach a continuation sheet.

10.13 (continued)

[2]If double mechanical seals are operated with the barrier (B) fluid at a pressure greater than the pump stuffing box pressure and/or equipped with a sensor (S) that will detect failure of the seal system, the barrier fluid system, or both, indicate with a "B" and/or an "S", respectively

[3]Conditions existing in the valve during normal operation

[4]Report all pressure relief devices in service, including those equipped with control devices

[5]Lines closed during normal operation that would be used during maintenance operations

10.14 Pressure Relief Devices with Controls -- Complete the following table for those pressure relief devices identified in 10.13 to indicate which pressure relief devices in service are controlled. If a pressure relief device is not controlled, enter "None" under column c.

CBI

[ ]

a. Number of Pressure Relief Devices	b. Percent Chemical in Vessel[1]	c. Control Device	d. Estimated Control Efficiency[2]
NONE			

[1]Refer to the table in question 10.13 and record the percent range given under the heading entitled "Number of Components in Service by Weight Percent of Listed Substance" (e.g., <5%, 5-10%, 11-25%, etc.)

[2]The EPA assigns a control efficiency of 100 percent for equipment leaks controlled with rupture discs under normal operating conditions. The EPA assigns a control efficiency of 98 percent for emissions routed to a flare under normal operating conditions

[ ] Mark (X) this box if you attach a continuation sheet.

10.15 Equipment Leak Detection -- If a formal leak detection and repair program is in place, complete the following table regarding those leak detection and repair procedures. Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... _____

Equipment Type	Leak Detection Concentration (ppm or mg/m^3) Measured at ____ Inches from Source	Detection Device[1]	Frequency of Leak Detection (per year)	Repairs Initiated (days after detection)	Repairs Completed (days after initiated)
Pump seals					
Packed	NONE				
Mechanical					
Double mechanical					
Compressor seals					
Flanges					
Valves					
Gas					
Liquid					
Pressure relief devices (gas or vapor only)					
Sample connections					
Gas					
Liquid					
Open-ended lines					
Gas					
Liquid					

[1]Use the following codes to designate detection device:

POVA = Portable organic vapor analyzer
FPM = Fixed point monitoring
O = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

[ ] Mark (X) this box if you attach a continuation sheet.

10.16 Raw Material, Intermediate and Product Storage Emissions - - Complete the following table by providing the information on each liquid raw material, intermediate, and product storage vessel containing the listed substance as identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Vessel Type[1]	Floating Roof Seals[2]	Composition of Stored Materials[3]	Throughput (liters per year)	Vessel Filling Rate (gpm)	Vessel Filling Duration (min)	Vessel Inner Diameter (m)	Vessel Height (m)	Operating Vessel Volume (l)	Vessel Emission Controls[4]	Design Flow Rate[5]	Vent Diameter (cm)	Control Efficiency (%)	Basis for Estimate[6]
Drum, 55-gallon, Steel													

[1]Use the following codes to designate vessel type:

F = Fixed roof
CIF = Contact internal floating roof
NCIF = Noncontact internal floating roof
EFR = External floating roof
P = Pressure vessel (indicate pressure rating)
H = Horizontal
U = Underground

[2]Use the following codes to designate floating roof seals:

MS1 = Mechanical shoe, primary
MS2 = Shoe-mounted secondary
MS2R = Rim-mounted, secondary
LM1 = Liquid-mounted resilient filled seal, primary
LM2 = Rim-mounted shield
LMW = Weather shield
VM1 = Vapor mounted resilient filled seal, primary
VM2 = Rim-mounted secondary
VMW = Weather shield

[3]Indicate weight percent of the listed substance. Include the total volatile organic content in parenthesis

[4]Other than floating roofs

[5]Gas/vapor flow rate the emission control device was designed to handle (specify flow rate units)

[6]Use the following codes to designate basis for estimate of control efficiency:

C = Calculations
S = Sampling

PART D RELEASE TO WATER

10.17 National Pollutant Discharge Elimination System (NPDES) Discharges -- Complete the following information for each body of water NPDES discharges are discharged into. If discharges are to more than one body of water, photocopy this question and complete it separately for each discharge.

CBI

[ ]

Discharge source (stream ID code) ..... NA

Is discharge to a moving or standing body of water? Circle the appropriate response.

Moving body of water 1

Standing body of water 2

Estimated average base flow (moving) ..... _____ l/day

Estimated average volume (standing) ..... _____ l

Average volume of discharge from facility ..... _____ l/day

_____ days/year

Maximum volume of discharge from facility ..... _____ l/day

_____ days/year

Average concentration of listed substance in discharge .... _____ mg/l or ppm

Maximum concentration of listed substance in discharge .... _____ mg/l or ppm

10.18 Publicly Owned Treatment Works (POTW) -- Complete the following information for discharges containing the listed substance which are discharged to a POTW from your facility.

CBI

[ ] Discharge source (stream ID code) ..... NA

Average volume of discharge from facility ..... _____ l/day

_____ days/year

Maximum volume of discharge from facility ..... _____ l/day

_____ days/year

Average concentration of listed substance in discharge .... _____ mg/l or ppm

Maximum concentration of listed substance in discharge .... _____ mg/l or ppm

[ ] Mark (X) this box if you attach a continuation sheet.

10.19 Nonpoint Sources -- Complete the following information for each nonpoint discharge source. Examples of nonpoint sources include stormwater runoff, waste pile runoff, and runoff from product or raw material storage areas or other sources that contain the listed substance and may be discharged to surface water. Exclude NPDES or POTW discharges. If discharges are to more than one body of water, photocopy this question and complete it separately for each discharge.

CBI

[ ] Discharge source (stream ID code) ..... NA

Is discharge to a moving or standing body of water? Circle the appropriate response.

Moving body of water 1

Standing body of water 2

Estimated average base flow (moving) ..... _____ l/day

Estimated average volume (standing) ..... _____ l

Average volume of discharge from facility ..... _____ l/day

_____ days/year

Maximum volume of discharge from facility ..... _____ l/day

_____ days/year

Average concentration of listed substance in discharge .... _____ mg/l or ppm

Maximum concentration of listed substance in discharge .... _____ mg/l or ppm

[ ] Mark (X) this box if you attach a continuation sheet.

10.20 Releases to Soils -- Complete the following information for up to three random soil core samples that were taken and analyzed for the listed substance during the reporting year. Report the concentrations of the listed substance determined by soil core monitoring studies/tests. Specify the distance from the facility that soil cores were taken, and indicate the soil type and sample depth of the soil cores. (Refer to the glossary for definitions of soil textures given in foo note 2.)

CBI

[ ]

Sample	Concentration (ug/kg) of Listed Substance (± % precision)	Distance from Plant (m)[1]	Soil Texture[2]	Sample Depth (cm
1	NA			
2				
3				

[1]Use the following code to designate if the sample was taken within the facility's boundary:

OS = On-site

[2]Use the following codes to designate soil texture:

A = Sand	G = Sandy clay loam
B = Loamy sand	H = Clay loam
C = Sandy loam	I = Silty clay loam
D = Loam	J = Sandy clay
E = Silty loam	K = Silty clay
F = Silt	L = Clay

10.21 Releases to Groundwater -- Complete the following information for up to three rando samples of groundwater from monitoring wells during the reporting year that were analyzed for the listed substance. The average and maximum concentration refers to the listed substance.

CBI

[ ]

Sample	Distance from Plant (m)[1]	Well Depth (m)	Average Concentration (mg/l) (± % precision)	Maximum Concentration (mg/l) (± % precision
1	NA			
2				
3				

[1]Use the following code to designate if the sample was taken within the facility's boundary:

OS = On-site

[ ] Mark (X) this box if you attach a continuation sheet.

10.22 Releases to Drinking Water -- Complete the following table for up to three samples from drinking water wells monitored during the reporting year. The average and maximum concentration refers to the listed substance.

CBI

[ ]

Well	Well Depth (m)	Distance from Plant (m)[1]	Average Concentration (mg/l) (± % precision)	Maximum Concentration (mg/l) (± % precision)
1	NA			
2				
3				

[1] Use the following code to designate if the sample was taken within the facility's boundary:

OS = On-site

[ ] Mark (X) this box if you attach a continuation sheet.

PART E NON-ROUTINE RELEASES

10.23 Indicate the date and time when the release occurred and when the release ceased or was stopped. If there were more than six releases, attach a continuation sheet and list all releases.

Release	Date Started	Time (am/pm)	Date Stopped	Time (am/pm)
1	NONE			
2				
3				
4				
5				
6				

10.24 Specify the weather conditions at the time of each release.

Release	Wind Speed (km/hr)	Wind Direction	Humidity (%)	Temperature (°C)	Precipitation (Y/N)
1	NA				
2					
3					
4					
5					
6					

[ ] Mark (X) this box if you attach a continuation sheet.

10.25 Complete the following information for each media into which the listed substance was released. Any volatile substance that was released to land, but that was expected to volatilize, should be listed as a release to air.

Release No. ..... _____

Media	Quantity (kg)	Method of Release	Migration Beyond Boundaries (Y/N)	Quantity Migrated (kg)
Land	NA			
Air				
Groundwater				
Surface water				

10.26 Specify the physical state and concentration of the listed substance at the time and point of release.

Release No. ..... NA

Point of release ..... _____

Physical state ..... _____

Concentration (%) ..... _____

[ ] Mark (X) this box if you attach a continuation sheet.

10.27 Circle all appropriate responses relating to the cause and the effects of the release.

Release No. ..... NA

Cause of Release

Equipment failure 1

Operator error 2

Bypass condition 3

Upset condition 4

Fire 5

Unknown 6

Other (specify) _____ 7

Results of Release

Spill 1

Vapor release 2

Explosion 3

Fire 4

Other (specify) _____ 5

[ ] Mark (X) this box if you attach a continuation sheet.

10.28 Specify which authorities were notified of the release.

Release No. .... NA

a. Federal

Agency [_]

Office [_]

Contact Person [_]

Address [_]
Street

[_]
City

[_][_]
State

Telephone Number .... [_][_][_]-[_][_][_]-[_][_][_][_]

Date Notified .... [_][_] [_][_] [_][_]
Mo. Day Year

Time Notified .... [_][_][_][_] am/pm

b. State

Agency [_]

Office [_]

Contact Person [_]

Address [_]
Street

[_]
City

[_][_]
State

Telephone Number .... [_][_][_]-[_][_][_]-[_][_][_][_]

Date Notified .... [_][_] [_][_] [_][_]
Mo. Day Year

Time Notified .... [_][_][_][_] am/pm

10.28 continued below

[_] Mark (X) this box if you attach a continuation sheet.

10.28 (continued)

c. Local

Agency [__]

Office [__]

Contact Person [__]

Address [__]
Street

[__]
City

[__][__]
State

Telephone Number ..... [__][__][__]-[__][__][__]-[__][__][__][__]

Date Notified ..... [__][__] [__][__] [__][__]
Mo. Day Year

Time Notified ..... [__][__][__][__] am/pm

10.29 For each of the proximities listed below, indicate whether the population living within that proximity was notified of, or evacuated because of the release. Specify who notified the population, the number of people evacuated, if any, and the date and time of day the evacuation began.

Release No. ..... NA

Proximity to the Release	Notified of Release (Y/N)	Notifying Person	Notifying Person's Telephone Number	Area Evacuated (Y/N)	Number of Persons Evacuated	Date and Time of Day Evacuation Began
1/4 mile						
1/2 mile						
1 mile						
Other (specify)						

[__] Mark (X) this box if you attach a continuation sheet.

10.30 Specify the number of personal injuries or casualties resulting from the release.

Release No. ..... NA

Number of injuries to facility employees ..... _____

Number of injuries to general population ..... _____

Number of deaths to facility employees ..... _____

Number of deaths to general population ..... _____

10.31 Indicate who conducted cleanup activities, and the dates over which the cleanup was performed.

Release No. ..... NA

Name [__]

Address [__]
Street

[__]
City

[__][__] State [__][__][__][__][__]--[__][__][__][__] Zip

Telephone Number ..... [__][__][__]-[__][__][__]-[__][__][__][__]

Date Cleanup Initiated ..... [__][__] Mo. [__][__] Year

Date Cleanup Completed (or expected) ..... [__][__] Mo. [__][__] Year

10.32 Briefly describe the release prevention practices and policies (backup systems, containment systems, training programs, etc.) in place at the facility at the time the release occurred.

Release No. ..... NA

[__] Mark (X) this box if you attach a continuation sheet.

10.33 Indicate which of the prevention practices and policies listed in question 10.32 were ineffective in preventing the release from reaching the environment.

Release No. ..... NA

10.34 Describe all repairs and/or preventive measures (management practices, operational changes, etc.) made to equipment or operations as a result of the release.

Release No. ..... NA

10.35 Describe additional preventive measures that will be taken to minimize the possibilities of recurrence.

Release No. ..... NA

[ ] Mark (X) this box if you attach a continuation sheet.

APPENDIX I: List of Continuation Sheets

Attach continuation sheets for sections of this form and optional information after this page. In column 1, clearly identify the continuation sheet by listing the question number to which it relates. In column 2, enter the inclusive page numbers of the continuation sheet for each question number.

Question Number (1)	Continuation Sheet Page Numbers (2)
7.05	
7.06	
8.01	
8.05	
8.06	
9.06	
9.07	
9.12	
9.14	
9.16	
9.19	
10.07	

[ ] Mark (X) this box if you attach a continuation sheet.

APPENDIX II: Substantiation Form and Instructions to Accompany Claims of Confidentiality Under the Comprehensive Assessment Information Rule (CAIR)

If you assert one or more claims of confidentiality for information submitted on a Comprehensive Assessment Information Rule (CAIR) form, please answer, pursuant to 40 CFR 740.219, all the following questions in the space provided. Type all responses. If you need more space to answer a particular question, please use additional sheets. If you use additional sheets, be sure to include the section, number, and (if applicable) subpart of the question being answered, and write your facility's name and Dun & Bradstreet Number in the lower right-hand corner of each sheet. A completed copy of this form must accompany all submissions containing one or more claims of confidentiality. Failure to do so will result in the waiver of your claim of confidentiality.

EPA has identified six information categories as those which encompass all claims of confidentiality. These are: Submitter identity (h); Substance identity (i); Volume manufactured, imported, or processed (j); Use information (k); Process information (l); and Other information (m). Respondents who assert a CBI claim on the reporting form must mark the letter(s) (h through m) that represent(s) the appropriate category(ies) of confidentiality in the box adjacent to the question, and answer the questions in this form.

Respondents who assert a CBI claim for information submitted under CAIR must also provide EPA with sanitized and unsanitized versions of their submissions. The unsanitized version must be complete and contain all information being claimed as confidential. The sanitized copy must contain only information not claimed as confidential. EPA will place the second copy of the submission in the public file. Failure to submit the second copy of the form at the time the respondent submits the reporting form containing confidential information or after receipt of a notice from EPA thereafter will result in a waiver of the respondent's claim of confidentiality.

Please indicate the CAS Registry Number (if known) or chemical name (if the CAS Registry Number is not known) for the substance that is the subject of this form:

_____

If you are reporting on a tradename, please provide the tradename for the substance that is the subject of this form:

_____

Does this form contain CBI? [ ] Yes [ ] No

If the answer to this question is yes, you must bracket the text claimed as CBI. Any unbracketed information may be placed in the public file.

[__] Mark (X) this box if you attach a continuation sheet.

A. All Claims. Respondents who assert any CBI claims must answer the following questions in addition to the appropriate questions from sections B through G, below:

(1) For what period do you assert a claim of confidentiality? If a claim is to extend until a certain event or point in time, please indicate that event or time period. If the period indicated is longer than 2 calendar years, explain why. If different periods of protection are required for different categories of information, please so indicate.

(2) Has the information that you are claiming as confidential been or will it be disclosed to individuals outside your company?

[ ] Yes [ ] No

If so, what, if any, restrictions apply to the use or further disclosure of the information?

(3) Briefly describe the physical and procedural restrictions, if any, within your company on the use and storage of the information you are claiming as confidential. What other steps have you taken to prevent the undesired disclosure of the information by others?

(4) Does the information you are claiming as confidential appear or is it referred to in advertising, promotional, or safety materials for the substance or an end-product containing the substance?

[ ] Yes [ ] No

Does it appear or is it referred to in professional or trade publications?

[ ] Yes [ ] No

If so, indicate why the information should nonetheless be considered confidential.

[ ] Mark (X) this box if you attach a continuation sheet.

(5) If the information you wish to claim as confidential were to be disclosed to the public by EPA, how much difficulty would a new competitor have in entering the market for this substance, considering such constraints as capital and marketing costs, specialized marketing expertise, or unusual production processes?

(6) Has EPA, another Federal agency, or a Federal Court made any pertinent confidentiality determinations for information regarding this substance?

[ ] Yes [ ] No

If so, please identify the entity and provide EPA with copies of such determinations.

B. Submitter Identity (code h). Respondents who assert CBI claims for submitter identity must also answer the following questions:

(1) Approximately how many competitors do you have in the market for this substance or the final product containing this substance?

(2) What harm, if any, would result from EPA's disclosure of the submitter identity? Provide detailed descriptions of both the probable harm from disclosure and the causal relationship between disclosure and harm.

(3) If you have also asserted a claim of confidentiality for substance identity, what harm to your company's competitive position would result from disclosure of your company's identity if the substance identity were to remain confidential?

[ ] Mark (X) this box if you attach a continuation sheet.

C. Substance Identity (code i). Specific substance identity can be claimed as confidential only if that substance identity is confidential for purposes of the TSCA Chemical Substance Inventory. Respondents who assert CBI claims for substance identity must also answer the following questions:

(1) (a) Has the substance been patented or disclosed in a patent in the U.S. or elsewhere?

[ ] Yes [ ] No

If so, indicate the relevant patent(s) and the reasons why the substance identity should nonetheless be considered confidential.

Patent Number: _____

(b) Exactly what information which does not appear in the patent would be disclosed to competitors by releasing the specific substance identity? Explain in detail how competitors could use this information.

(c) Since the patent provides protection for the substance, why are you asserting confidentiality?

(2) (a) In what form (i.e., product, effluent, emission, etc.) does this substance leave your site?

(b) What measures have you taken to guard against the discovery of the substance identity by others?

[ ] Mark (X) this box if you attach a continuation sheet.

(c) If the substance is formulated with other chemicals, list them, and state the concentration of the claimed substance in the mixture.

(3) (a) If the substance leaves the site in a product that is available to the public or your competitors, can the substance be identified by analysis of the product?

[ ] Yes [ ] No

(b) Is it likely that a competitor has attempted or will attempt to chemically analyze the substance?

[ ] Yes [ ] No

(c) Would the cost and difficulty of such analysis be great or small? Why?

(4) What harm, if any, would result from EPA's public disclosure of the specific chemical identity? Provide detailed descriptions of both the probable harm to your company from disclosure and the causal relationship between release and harm.

(5) Would public disclosure of the specific chemical identity reveal to your competitors the use of the substance or the process by which this substance is manufactured?

[ ] Mark (X) this box if you attach a continuation sheet.

D. Volume Manufactured, Imported, or Processed (code j). Respondents who assert CBI claims for volume manufactured, imported, or processed must also answer the following questions:

(1) If you have also claimed submitter's name as confidential and EPA keeps confidential the link between your company identity and the volume manufactured, imported, or processed, your identity will not be associated in any way with that volume. In this case, what harm to your company's competitive position would result from disclosing that volume? How could a competitor use this information? What is the causal relationship between the disclosure and the harm?

(2) If you have also claimed substance identity as confidential and EPA keeps confidential the link between the substance identity and the volume manufactured, imported, or processed, the substance identity will not be associated in any way with that volume. In this case, what harm to your company's competitive position would result from disclosing that volume? How could a competitor use that information? What is the causal relationship between the disclosure and the harm?

(3) If you have claimed neither submitter nor substance identity as confidential, what harm, if any, would result from release of your volume manufactured, imported, or processed? Provide a detailed description of both the harm and the causal relationship between disclosure and harm.

E. Use Information (code k). Respondents who assert CBI claims for use information must also answer the following questions:

(1) If you have also claimed submitter identity as confidential and EPA keeps confidential the link between your company identity and the use data, your identity will not be associated in any way with the use data. In this case, what harm to your competitive position would result from disclosing the use data? How could a competitor use this information? What is the causal relationship between the disclosure and the harm?

[ ] Mark (X) this box if you attach a continuation sheet.

(2) If you have also claimed substance identity as confidential and EPA keeps confidentia the link between the substance identity and the use data, the substance identity will not be associated in any way with the use data. In this case, what harm to your company's competitive position would result from disclosing the use data? How could a competitor us this information? What is the causal relationship between the disclosure and the harm?

(3) If you have claimed neither submitter nor substance identity as confidential, what harm, if any, would result from release of your use information? Provide a detailed description of both the harm and the causal relationship between disclosure and harm.

F. Process information (code 1). Respondents who assert CBI claims for process information must also answer the following questions:

(1) If you have also claimed submitter identity as confidential and EPA keeps confidentia the link between your company identity and process information, your identity will not be associated in any way with this information. In this case, what harm to your competitive position would result from disclosing the process information? How could a competitor use this information? What is the causal relationship between the disclosure and the harm?

(2) If you have also claimed substance identity as confidential and EPA keeps confidentia the link between the substance identity and the process information, the substance identity will not be associated in any way with the process information. In this case, what harm t your company's competitive position would result from disclosing the process information? How could a competitor use this information? What is the causal relationship between the disclosure and the harm?

[ ] Mark (X) this box if you attach a continuation sheet.

(3) If you claimed neither submitter nor substance identity as confidential, what harm, i any, would result from release of your process information? Provide a detailed descriptio of both the harm and the causal relationship between the disclosure and the harm.

G. Other information (code m). Respondents who assert CBI claims using the "other information" category, must also answer the following questions:

(1) Is the item confidential in and of itself, or is it confidential because it will reveal some other confidential information, whether or not that other information is reported on this form? If the latter, what is the information that will be revealed, and how would disclosure of the item in turn lead to disclosure of the other information?

(2) Describe with specificity the harm to your company's competitive position which would result from disclosing the information.

(3) If you have also claimed submitter identity as confidential and EPA keeps confidentia the link between your company identity and this information, your identity will not be associated in any way with the item claimed. In this case, what harm to your competitive position would result from disclosing the item? How could a competitor use this information? What is the causal relationship between the disclosure and the harm?

(4) If you have also claimed substance identity as confidential and EPA keeps confidentia the link between the substance identity and the item, the substance identity (other than category name) will not be associated in any way with the item claimed. In this case, what harm to your company's competitive position would result from disclosing the item? How could a competitor use this information? What is the causal relationship between the disclosure and the harm?

[ ] Mark (X) this box if you attach a continuation sheet.

I certify that I have personally examined and am familiar with the information submitted in this CBI Substantiation Form and all attached documents. Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete.

NAME	SIGNATURE	DATE SIGNED

TITLE	( ) - TELEPHONE NO.

[ ] Mark (X) this box if you attach a continuation sheet.